THE IRON TRADE REVIEW

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GLOOMY PROSPECT

IN NEARLY ALL IRON AND STEEL LINES.

Curtailment of Production and Lowering of Wages Seem Inevitable—Stocks of Pig Iron Accumulating.

Gloomy feelings predominate in the iron trade. This condition is due in part to the proposed radical reductions in the tariff on iron and steel products and to the expectation that a number of months will pass before the tariff is enacted into a law. The pessimistic sentiment may also be attributed in part to the failure of recent reductions in prices to develop any large amount of business. With the demand for finished products limited and many rumors of cutting of prices, with pig iron stocks piling high, the market very dull and prices weak and with the expectation of many plants being closed and a general reduction in wages the prospect is far from pleasing to both employers and employes. Unless business improves within a few days the great steel plant of the Tennessee Coal, Iron & Railroad Co., at Ensley, not including the merchant furnaces, will cease operation about April 1, and it is not improbable that a number of other steel plants will become idle. Much more general reductions of wages than have yet taken place seem to be inevitable.

Curtailing Production. Owing to the large accumulations of pig iron and almost entire lack of interest of buyers and the weakness of prices, an effort to bring about concerted action in curtailing production in the Pittsburg district and the Mahoning and Shenango valleys is being made. Similar action is expected in the east, where conditions are more unfavorable than generally supposed. Foundry pig iron is selling in the south at from $11 to $11.50 for No. 2, and lower prices are prevailing in the central west and in the east. The demand for basic is at a standstill, and in the east, many steel plants have asked for suspension of shipments on contracts. Some furnaces will continue operating until ore supplies now on hand are exhausted. This in some instances will mean until June, and they will then shut down, unless a decided improvement has developed.

Structural Material. The contract for the steel required in the construction of the Gimbel building, New York city, about 12,000 tons of Bethlehem sections, has been taken by the Bethlehem Steel Co., and the fabricating work will be done by Milliken Bros. This building, and the People's Gas Co. building, in Chicago, also employing Bethlehem sections, are the two largest building operations recently let. Persistent rumors of structural steel selling below the 1.30c price Pittsburg continue to be heard and it is undoubtedly true that if fabricating and erecting costs are figured at the usual rates the allowance for plain material must be very low but price cutting seems to be confined largely to fabricating and erecting and in numerous cases full price for the plain material has been obtained. Some irregularity has developed in steel bars but for the most part the price of 1.20c Pittsburg is being adhered to. Some annual contracts are being made. The Philadelphia Co. has placed a contract for from 25 to 30 miles of 16-inch line pipe. The demand for sheets shows some improvement.

WAGE REDUCTIONS

In Pittsburg District, Mahoning and Shenango Valleys Expected.

Conditions in the iron and steel industry have reached the stage where a general readjustment of wages in the Pittsburg district, Mahoning and Shenango valleys is expected to take place within a very short time. Present indications are that notices of reductions ranging from 10 per cent and upwards and applying to both steel works and blast furnace employes, will be posted about April 1.

In the case of blast furnace workers, some of the largest merchant interests in the Mahoning and Shenango valleys have already determined upon a 10 per cent cut, effective April 1. Other pig iron makers in these districts are arranging to do likewise. It was originally thought that blast furnace labor, by reason of its being a very small factor in production costs, would escape reductions, but it has been decided that it must share in the general readjustment.

The daily classified scale of blast furnace wages now in force in the Pittsburg district and valley territory is as follows:

Keepers	$2.75
Helpers	2.20
Fillers	2.20
Tenders	2.35
Laborers	1.60

In the steel works, the reductions are expected to range from 10 per cent for the lower grades of labor to larger corresponding cuts in the pay of skilled men. Steel makers say the lower tariff duties proposed together with the general conditions now prevailing in the industry, have made a problem of wage costs that could not be avoided.

Some agitation has also been made among coke operators to bring about a general reduction in the wages of the oven workers in the Connellsville regions. Such action is dependent upon the attitude of the H. C. Frick Coke Co., the scales of which are generally followed by the independent interests, but no indication has been given as to larger corresponding cuts by the former company.

THE WEEK IN IRON CENTERS

PITTSBURG.

Important Developments Expected—May Curtail Pig Iron Production.

Office of THE IRON TRADE REVIEW, 510 Park Bldg., March 23.

Some interesting developments in the iron and steel industry in Pittsburg and other districts are anticipated shortly. Since the announcement of the proposed tariff schedules showing severe reductions, iron and steel makers declare a re-adjustment of wages in Pittsburg and valley territory can no longer be avoided. This is expected to take place about April 1 and will apply to blast furnace as well as steel mill workers. The reduction, it is believed, will consist of a minimum of 10 per cent for the lower grades of labor and correspondingly greater in the case of the higher skilled employes.

In order to adjust current production with its increasing stocks to the very moderate demand for pig iron, representative furnace interests are now advocating the blowing out of all active merchant stacks in the Mahoning and Shenango valleys for a period of 60 days or longer as the needs of the situation may dictate. The plan is now under serious consideration.

It cannot be said that the announcement of the revised tariff duties provided in the Payne bill has had a noticeable bearing upon iron and steel buying during the past week. The sharp cuts proposed particularly in finished material, although they confirmed the worst expectations of iron and steel manufacturers, are believed to have been fully discounted by the recent price reductions. Makers are now urging a quick enactment of the bill in some form and the effectual settlement of the tariff problem, the doubt over which has been a very disturbing factor in the market.

Better orders in bars, shapes and plates are now coming to the mills and tubular goods are also beginning to show some improvement. Negotiations have been opened with the implement consumers of steel bars and some yearly contracts are now being placed.

Pig Iron.—A movement is under way among Mahoning and Shenango valley furnace interests to effect an agreement whereby the active merchant stacks in these districts will be blown out or banked for a fixed period, possibly 60 days. Although production has been greatly curtailed, stocks are heavy and are not being perceptibly decreased. In the case of furnaces supplying long-term contracts it is believed that present stocks will be amply sufficient to fill these requirements as well as current needs without these stacks being obliged to run. The plan is in the hands of representative furnace interests. At the present time there are 10 out of 18 merchant furnaces in the two valleys in operation. In the Mahoning valley, one Hubbard, Brier Hill, Struthers, Girard, Tod, Cherry Valley and Dover are running, and one Hubbard, Mary and McKeefry are out. In the Shenango valley, two Shenango and Stewart are going, while one Shenango, Sharpsville, Ella, Claire and Fannie are idle. The Tod furnace has just gone in and Shenango No. 3, which has been undergoing rebuilding, is expected to start next week.

Some inquiry for second quarter iron has developed in this territory, a local foundry having sent out an inquiry for 1,500 tons of No. 2. There are other interests which are not well covered beyond this month and April and they are expected to be buyers soon. The International Harvester Co. has been inquiring for 5,200 tons of foundry and malleable for Auburn, N. Y., and Hamilton, Ont., and has bought some of this tonnage. The Commonwealth Steel Co., St. Louis, is still in the market for 2,000 tons of northern basic.

Prices continue to sag owing to the light demand. A valley foundry bought a small lot of No. 2 for prompt shipment on a basis of $14.50 at a nearby furnace. A sale of a small tonnage of No. 2 at $14.70 valley is reported. Light Bessemer sales have been made at $15.25 valley. Basic, malleable and forge are wholly nominal at $15, $14.75 and $13.75 valley respectively. On prompt and second quarter shipment on northern iron, we quote as follows:

Bessemer, valley	$15.25 to 15.50
Bessemer, Pittsburg	16.15 to 16.40
No. 2 foundry, Pittsburg	15.40 to 15.65
Gray forge, Pittsburg	14.65 to 14.90
Basic, valley	15.00 to 15.25
Basic, Pittsburg	15.90 to 16.15

Ferro-Alloys.—The market in ferro-alloys continues very quiet and the few sales are confined to prompt shipment. Prices are largely nominal and are inclined to softness.

We quote 80 per cent ferro-manganese at $42 to $43 Baltimore, with a freight rate of $1.95 to Pittsburg.

Imported 50 per cent ferro-silicon is quoted at $61 to $61.50 Pittsburg on forward deliveries; domestic, 12 per cent, $26; 11 per cent, $25; 10 per cent, $24, Pittsburg.

Plates.—The Wabash - Pittsburg terminal railroad has ordered 500 steel hopper cars of 100,000 pounds capacity each from the Standard Steel Car Co., and the Carnegie Steel Co. will furnish the plates and shapes required. Car building prospects are not as bright as they were three months ago. Inquiry at present is light, although several lines are considering extensive purchases. No boat building of importance is in sight. The mills are getting better specifications on plates from the car, boat and structural business recently placed. The 1.30c price on plates is said to be well observed, and the shading is not of extensive proportions. We quote the present plate market as follows:

Tank plate, ¼-inch thick, 6¼ to 100 inches, 1.30c f. o. b. mill. Extras are as follows per 100 pounds: Boiler and flange steel plate, 0.10c; A. B. M. A. and ordinary firebox steel plates, 0.20c; still bottom steel, 0.30c; marine steel, 0.40c; locomotive fire box steel, 0.50c; all sketches, excepting straight taper plates varying not more than 4 inches in width at ends, narrowest end not being less than 30 inches, 0.10c; circles, 0.20c. Plates in widths over 110 inches up to 115 inches, 0.05c; over 110 inches up to 115 inches, 0.10c; over 115 inches up to 120 inches, 0.15c; over 120 inches up to 125 inches, 0.25c; over 125 inches up to 130 inches, 0.50c; over 130 inches, 1c. Gages under ½-inch to and including 3/16-inch plate on thin edges, 0.10c; under 3/16 to and including No. 8, 0.15c; under No. 8 and including No. 9, 0.25c. Five cents extra for less than carloads. Terms net cash in 30 days.

Sheets.—Although only a moderate amount of new business is being offered, increased specifications against present contracts are reported by some interests. The American Sheet & Tin Plate Co. is operating at a higher percentage of capacity than it has been for months. This week it started operations at its Leechburg works of 11 mills and at its Scottdale works of nine mills, making 58 per cent of its total equipment now running, compared with 50 per cent last week and 46 per cent the preceding week. Arrangements are also being made to start other idle works. The quoted schedule of sheet prices is

being considerably shaded in some quarters, and this is particularly true in the corrugated product. The price schedule on carloads which represents the views of the independents is as follows:

Black sheets, Nos. 13 and 14, 2c; Nos. 15 and 16, 2.05c; Nos. 17 to 21, 2.10c; Nos. 22 to 24, 2.15c; Nos. 25 and 26, 2.20c; No. 27, 2.25c; No. 28, 2.30c; No. 29, 2.35c; No. 30, 2.45c; galvanized sheets, Nos. 13 and 14, 2.35c; Nos. 15 and 16, 2.45c; Nos. 17 to 21, 2.55c; Nos. 22 to 24, 2.70c; Nos. 25 and 26, 2.90c; No. 27, 3.10c; No. 28, 3.30c; No. 29, 3.40c; No. 30, 3.65c; painted roofing, $1.65 per square for No. 28 gage, 2½-inch corrugation, and galvanized roofing, $2.90 per square for No. 28 gage, 2½-inch corrugation.

Tin Plate.—The adjustment of contracts following the making of a $5 cut in tin plate has considerably disturbed the specifications of some makers, and the volume of orders last week was light compared with previous similar periods. It is expected that business will be moving at its usual gait just as soon as the trade has aligned itself with the new conditions. Requirements of consumers for shipment up to July 1 are well covered, and new business over the first half is consequently light. Some makers who are more aggressive for business have opened their books for delivery beyond this date, and are now taking some contracts. The operations of the leading interest this week are at 78 per cent of capacity compared with 68 per cent last week, the New Castle plant of 20 mills having been started full this week after a practically nine-months' shut-down. The La Belle works of 10 mills will also be started shortly. We quote the present market as follows:

Coke tin plate, 100-pound basis, 14 x 20, $3.45 f. o. b. mill Pittsburg district and $3.40 in large lots. Terms, 30 days, less 2 per cent for cash in 10 days.

Rails and Track Material.—The light rail situation is more satisfactory from the standpoint of the mills rolling from billets, because the re-rolling mills are not so aggressive in forcing low prices in competition. Some of the latter have considerably elevated their asking prices and are selling closer to the quoted market. The light rail bookings of the Carnegie Steel Co. during the past week were about 2,000 tons. No additional contracts of importance in standard sections have been taken. The Pennsylvania and Baltimore & Ohio tonnages, which were for reasonably prompt shipment, have been practically completed by the mills. The Edgar Thomson works, which is still running gaited, has some accumulated specifications against it which will require several weeks of the present schedule of operations to fill. The spike market is fairly firm, but no large orders are being taken. On present specifications on Bessemer rails, we quote as follows, the base price for open-hearth rails being $30 mill:

Fifty-pound and heavier, 500-ton lots and over, $28; carloads and less than 500 tons, $30; less than carload lots, $32; 8-pound, $32; 12-pound, $28; 16-pound, $26; 20-pound, $25; 25 to 45-pound, $24; angle splice bars for standard sections, 1.50c. Standard spikes, $1.70 to $1.80 Pittsburg; hand spikes, $1.80 to $1.90 Pittsburg.

Steel.—The increased operations of the American Sheet & Tin Plate Co. are diverting a greater tonnage of sheet and tin bars to the mills of the Carnegie Steel Co. Sheet bar prices are not altogether firm, and instances of small lots having been picked up at from $1 to $1.50 under the $25.50 Pittsburg district delivery price are reported. Makers will not, however, consider accepting requirement contracts at any such concessions. Considerable pressure has been brought to bear upon this market by sheet and tin plate manufacturers who are obliged to buy their steel, as the reduction in the semi-finished product is not thought to have been commensurate with that in sheets and tin plate. Billets are still held at $23 Pittsburg, but there is little new business.

Bessemer and open-hearth 4 x 4 billets with 0.25 carbon and less are quoted at $23 Pittsburg, with the usual extras for size and analysis, and forging billets at $25 Pittsburg. Sheet and tin bars are $25 Pittsburg. Some steel makers are still willing to divide the freight within the $1 limit, making the price in the immediate Pittsburg territory $23.50 delivered on billets and $25.50 delivered on sheet bars.

Hoops and Bands.—Specifications against standing hoop contracts have shown some improvement with the establishment of lower prices. There is only a fair amount of new business being booked and requirements generally are well covered. We quote present prices as follows:

Hoops in carload lots, 1.60c; in less than carload lots, 1.70c; bands, 1.20c, base half extras as per standard steel.

Merchant Bars.—Negotiations have been opened with the implement manufacturers for their annual requirements of steel bars and some contracts are now being taken. The solicitation of this trade is several months earlier this year than usual, but as prices at 1.20c Pittsburg are regarded as practically bottom, there is a disposition by these consumers to cover for their regular needs at this time. Steady orders against contracts are coming to the mills and some of the largest interests expect the March tonnage to show gains over February. Other makers, who are particularly fortunate in having the most active steel bar business in months in February up to the time of the break, do not anticipate so favorable a showing. There is little new contracting. The price of 1.20c Pittsburg is being well held on bars rolled from new steel, but rerollers are naming some low prices and are getting some business. In some of the specialties, their prices are such that the mills rolling from billets have declined to compete and are putting their steel into the firmer straight steel bar market. Building operations are producing a good demand for reinforcing bars. The nominal market on bar iron continues 1.40c Pittsburg. Some specifications have been brought out by the new discounts on shafting, but the condition of the market is such that there is little inducement to further shading. We quote present prices as follows:

Common iron bars, 1.40c Pittsburg, Bessemer and open-hearth steel bars, 1.20c; plow and cultivator, 1.20c; channels, angles, zees, tees under 3-inch, 1.30c, all f. o. b. mill. The following differentials are maintained on steel: Less than 2,000 pounds, 0.10c advance; less than 1,000 pounds of a size, 0.30c advance. Cold rolled and ground shafting, 60 per cent in carloads, and 55 per cent in less than carloads, delivered in base territory. Planished and machine straightened tire steel is 1.40c base; iron finished tire under 1½ by 1½ inches, 1.35c, both plus ½ extra on tire card; iron finished tire, 1½ by ½ and over, 1.20c, plus ½ extra on the steel bar card.

On cold rolled strip steel, width 1½ inches and wider, and 0.100 inch and thicker, we quote base prices for 100 pounds, $3.05 on hard, and $3.30 on soft.

Structural Material.—The railroads continue to evince a substantial interest in structural projects, and this, along with the fair seasonable activity, has given this market an encouraging tone. The mills are receiving better specifications on shapes and orders are generally on the 1.30c basis, although it is reported some makers are not unwilling to make concessions on attractive business. Competition among fabricators is still spirited and low prices are the rule. Advertising for bids has been ordered for a new county bridge across the Allegheny river at Oil City, Pa., which

will require about 2,000 tons. The Nickel Plate railroad has rejected the bids for 1,000 tons for new bridge work in Cleveland, and will ask new tenders. Bids have gone in for the new office building of the Standard Steel Car Co. at Butler, Pa., 500 tons and for 350 tons for government lock improvements in the Monongahela river at Brownsville, Pa. Considerable interest has been attracted to the latter contract by the submission of a single bid which was far below the general range, and which is thought to have been entered on a different section of the work than was intended. Next to this bid, the Pittsburg Bridge & Iron Co. is understood to have submitted the lowest figure. The Youngstown Wire & Iron Co. has taken the Wick-Salow-Wells building, Youngstown, 125 tons, and the John Eichleay Jr. Co., Pittsburg, has received the Mahoning county jail contract, Youngstown, 100 tons. We quote the present market as follows:

Beams and channels, 15-inch and under, 1.30c; over 15 inches, 1.40c; zees, 1.30c; tees, 1.35c; angles from 3 to 6 inches, 1.30c; over 6 inches, 1.40c; universal and sheared plates, 6¼ inches and wider, 1.30c base.

Merchant Pipe.—The Philadelphia Co. during the past week closed for 25 to 30 miles of 16-inch line pipe. None of the other large line projects in the market has been formally closed, although the prospects are very favorable that these and others now undergoing development will soon be placed with the mills. The merchant pipe trade is improving and the jobbers are buying better than they have been for sometime. There is also a good inquiry for the future, but some of the mills are not willing to take business for extended shipment at present prices. Merchant pipe prices are quite firm. The National Tube Co. is now operating at about 60 per cent of capacity. We quote the following official discounts on merchant pipe subject to five off to jobbers, while a few of the very large jobbers with mill connections are given an additional one point off.

	—Steel—		—Iron—	
	Black.	Galv.	Black.	Galv.
⅛ and ¼ inch.....	72	56	69	..
⅜ inch	73	59	70	56
½ inch	76	64	73	61
¾ to 6 inch.....	80	70	77	67
7 to 12 inch.....	75	60	72	57
PLUGGED AND REAMED.				
1 to 4 inch.....	78	68	75	65
EXTRA STRONG PLAIN ENDS.				
⅛ to ⅜ inch.....	65	53	62	50
½ to 4 inch.....	72	60	59	57
4½ to 8 inch.....	68	56	65	53
DOUBLE EXTRA STRONG PLAIN ENDS.				
⅛ to 8 inch.....	61	50	58	47

Boiler Tubes.—There is a little improvement in the demand for merchant tubes and the jobbers are specifying more freely. The railroads are also buying locomotive tubes in a somewhat larger way. We quote the following official discounts on lap-welded steel boiler tubes to jobbers in carloads:

1 to 1½ inch	50
1¾ to 2¼ inch	62
2½ inch	64
2¾ to 5 inch	70
6 to 13 inch	62

2½ inch and smaller, over 18 feet, 10 per cent net extra.

2¾ inch and larger, over 22 feet, 10 per cent net extra.

To destinations east of the Mississippi river will be sold at delivered discount for carloads lowered by two points, for lengths 22 feet and under; longer lengths, f. o. b. Pittsburg.

We quote the following discounts on charcoal iron tubes to jobbers:

1 to 1½ inch	45
1¾ to 2¼ inch	45
2½ inch	50
2¾ to 5 inch	57
6 to 13 inch	45

Wire Products.—Uncertainty over the stability of present prices is seriously retarding the spring trade in wire products, and contracting is very cautious and limited. Although reports of occasional shading are heard, the market is apparently well established. The independent interests which booked some business at concessions and then restored former prices are acting well in line with the leading interest. The aspect of this market is one of waiting for the atmosphere to clear. We continue to quote the present market as follows:

Wire nails, jobbers' carload lots, $1.95; retailers' carload lots, $2; painted barb wire, jobbers' carload lots, $2.10; retailers' carload lots, $2.15, with 30c for galvanizing; plain wire to jobbers in carloads, 1.80c, and to retailers in carloads, 1.85c.

Wire Rods.—There is nothing by which to determine present prices, and the market continues purely nominal at $33 Pittsburg on Bessemer and $34 Pittsburg on open-hearth rods.

Coke.—An attempted consolidation of independent coke operations in the Connellsville regions, which is now under way, is expected to have a salutary effect upon present depressed conditions, in the event of its consummation, by its power to adjust production to the market's demands. The general situation shows little change, although some decrease in cars on track has been brought about. Coke for prompt shipment may still be picked up at bargain prices. A sale of 150 tons of Connellsville furnace coke for prompt delivery was made the past week at $1.50 ovens. A little inquiry for second half has come out, but makers are reluctant to take on much of this business in the present market. A few small foundry contracts are being booked. We quote spot furnace coke at from $1.50 to $1.75 ovens and on contract from $1.75 to $1.90 ovens. For first-class foundry coke the range is from $2 to $2.25 ovens, the former price applying to prompt shipment. The *Courier's* figures for the week ending March 13 show 22,836 ovens active, with an output of 252,617 tons, compared with 23,218 active ovens and a production of 260,987 tons the previous week.

Old Material.—The old material market continues to decline in the state of extreme dullness prevailing, and further reductions are made in the able schedule. Offerings from dealers are coming out more freely and this tonnage is more than the market can readily absorb, as mill consumers are either well covered or are finding plenty of material for their demands. The proposed tariff reduction on scrap of from $4 to 50 cents a ton, if it is enacted, is expected to attract considerable Canadian railroad scrap to advantageous points in the American market. We quote gross tons delivered in the Pittsburg district as follows:

Heavy melting scrap, $14 to $14.50; re-rolling rails, $14.25 to $14.50; bundled sheet scrap, $11.50 to $12; iron axles, $18.50 to $19.50; old iron rails, $15 to $16; No. 1 wrought scrap, $13.50 to $14; old car wheels, $14.50 to $15; low phosphorus, $16 to $17; machine shop turnings, $9 to $9.50; cast borings, $8 to $8.50; No. 1 cast scrap, $13.75 to $14.25; malleable, $13 to $13.50; stove plate, $10.50 to $11.

CHICAGO.

Early Settlement of Tariff Hoped For —Good Business in Plates.

Office of THE IRON TRADE REVIEW,
1328 Monadnock Block, March 23.

No unusual developments have come to light during the week. In general, the market is less concerned with the particular schedules in the tariff bill than with an early settlement of the matter. No immediate effects of the revision are noticeable. In some directions, the market conditions seem to be improved, tonnage is better and sentiment is more hopeful, but such improvement is limited to specific cases. Pig iron is exceedingly quiet with some slight interest evinced in second half requirements. Prices are weak. Bar iron and bar steel are selling about on the same level, though the steel bar situation is the stronger; $1.35 Chicago is the top of the market for both products. There is an active campaign for orders in addition to which the situation is the more interesting by reason of the desire on the part of large bar consumers to contract

for next year. Trade in sheets is good and the leading interest is taking a good volume of plate tonnage. There is considerable structural tonnage moving. At the Gary plant, the new construction work is being pushed more rapidly. Steel is being placed for another open-hearth building, the billet mill is being pushed to completion, the erection of the first of the merchant mills has been begun and work is to start within the next week or two upon the universal plate mill. The scrap market continues inactive.

Pig Iron.—An almost complete absence of interest in foundry iron for shipment during the remainder of the first half is enlivened somewhat by a growing inquiry regarding second half iron. For the most part, furnace interests are uncertain as to their own position in the matter of prices for that delivery, largely because no definite assurance has been forthcoming that the price of ore will remain unchanged. It has been reported that a quotation has been made for last half at present price, but this is a distinct exception to the general attitude of the furnaces, most of which are avoiding the issue. Nearly all of the sales of the week have been for spot shipment in small lots and the prices have been for southern iron as low as $11.50 Birmingham, and for local iron as low as $16.50 delivered Chicago. The market is weak, particularly in the south. The Zenith furnace at Duluth has been blown out. We quote for Chicago delivery as follows:

Lake Superior charcoal	$19.50 to 20.00
Northern foundry No. 1	17.00 to 17.50
Northern foundry No. 2	16.50 to 17.00
Northern foundry No. 3	16.00 to 16.50
Southern foundry No. 1	16.35 to 16.85
Southern foundry No. 2	15.85 to 16.35
Southern foundry No. 3	15.35 to 15.85
Southern foundry No. 4	14.85 to 15.35
Southern No. 1 soft	16.35 to 16.85
Southern No. 2 soft	15.85 to 16.35
Southern gray forge	14.85 to 15.35
Southern mottled	14.60 to 15.50
Southern silveries, 4 per cent silicon	17.60 to 18.10
Southern silveries, 5 per cent silicon	18.10 to 18.60
Southern silveries, 6 per cent silicon	18.60 to 19.10
Jackson Co. silveries, 6 per cent.	19.40 to 19.90
Jackson Co. silveries, 8 per cent.	20.40 to 20.90
Jackson Co. silveries, 10 per cent	21.40 to 21.90
Malleable Bessemer	16.50 to 17.00
Standard Bessemer	17.40 to 17.90
Alabama basic	16.85 to 17.35

Billets.—The few sales of billets reported, consisting of carload lots, were placed at the full price of $25 Pittsburg for forging billets. The price is quite firm apparently, but the movement is limited. We quote nominally for Chicago delivery: 4 x 4-inch rolling billets, $26; forging billets, $28.

Merchant Bars.—The competition for business in iron bars is more active. It has been difficult to adhere to the 1.40c price and business is now going at prices ranging from 1.32½c to 1.35c. A fair volume of current business has developed in steel bars and, while the full freight differential of 18 cents over Pittsburg prices is not being observed, the situation is firm at 1.35c Chicago, and this price is being made quite uniformly. The requests by large bar consumers for contracts covering their bar requirements through another year are becoming more urgent. Without a change for the better in business conditions, there will be little ground upon which to base higher prices for next year's contracts. For this reason, contracting will undoubtedly be put off as long as possible by the mills in the hope of a turn for the better.

One of the western bar mills with probably the best facilities in this market for turning out small orders in assorted sizes has expressed itself as preferring to depend upon current business rather than to make contracts on the present basis. We quote as follows:

Bar iron, 1.40c; soft steel bars and bands, 1.38c half extras; soft steel angles, less than 3 x 3, 1.48c; hoops, 1.78c base, full extras; planished or smooth finished tire steel, 1.58c; iron finish, up to 1½ x ½-inch, 1.53c base tire card; iron finish, 1½ x ½-inch and larger, 1.38c base steel card; channel for solid rubber tire, ¾ to 1 inch, 1.88c and 1⅛-inch and larger, 1.78c; smooth-finished machinery steel, 1.63c; flat sleigh shoe, 1.43c; concave and convex sleigh shoe, 1.63c; cutter shoe, 2.75c; toe calk steel, 1.93c; railway spring, 1.73c, base steel card; vehicle spring steel, 1.78c base vehicle card; crucible tool steel, 7c to 9c, with higher prices asked on special grades. Quotations on shafting are 60 per cent off the list for carload lots, and 55 per cent off for less than carload lots, carload freight allowed to points in base territory. On iron and steel bars from local stocks, we quote as follows: Bar iron, 1.80c to 1.90c, full extras; soft steel bars, 1.60c per 100 pounds base, plus half extras; soft steel hoops, 2.10c full extras.

Plates.—The continuance of good orders and specifications well distributed among bridge shops, car builders, boiler shops and jobbers is reported by the leading interest. Both of the plate mills at South Works are running full. In this respect the leading interest is undoubtedly more favored than other mills. There is no great divergence from the generally accepted price of 1.30c Pittsburg, but some purchases continue to bring out their own terms and 1.45c is frequently quoted. For mill prices and extras, see Pittsburg report. Freight to Chicago, 18 cents. We quote from local stocks as follows:

Tank steel, ¼-inch and heavier, up to 72 inches wide, 1.70 to 1.80c; from 72 inches wide to 96 inches wide, 1.80c to 1.90c; 3/16-inch up to and including 60 inches wide, 1.80c to 1.85c; 72 inches wide, 2.05c to 2.10c; No. 8 up to 60 inches wide, 1.80c to 1.85c. Flange and head quality, 25c extra.

Sheets.—The trade in sheets continues very good, particularly from western points. Indications of increasing business in western territory appear in connection with requests for increasing contract tonnages. Jobbers are buying with considerable freedom for stock. All gages of sheets are in good demand, but more especially galvanized. The prevailing price for No. 28 galvanized is $3.25 Pittsburg with $1 a ton above that obtainable on some orders, For mill prices see Pittsburg report. Freight to Chicago, 18 cents. We quote store prices at Chicago as follows:

Store prices at Chicago: No. 10, 2c to 2.10c; No. 12, 2.05 to 2.15c; No. 14, 2.10c to 2.20c; No. 16, 2.20c to 2.30c; Nos. 18-20, 2.50c to 2.55c; Nos. 22-24, 2.55c to 2.60c; No. 26, 2.60c to 2.65c; No. 27, 2.65c to 2.70c; No. 28, 2.75c to 2.80c; No. 30, 3.05c; galvanized sheets, Nos. 10 to 16, 3c to 3.10c; Nos. 18 to 20, 3.05c to 3.15c; Nos. 22 to 24, 3.20c to 3.25c; No. 26, 3.40c to 3.45c; No. 27, 3.60c to 3.65c; No. 28, 3.80c to 3.90c; No. 30, 4.20c to 4.50c.

Structural Steel.—The aggressiveness of the leading fabricator in seeking business is evidenced by the fact that a majority of the contracts being let are placed with this company. Prices continue very low. The Chicago & Northwestern tonnage of 11,000 tons was placed, 9,000 tons with the American Bridge Co. and 2,000 tons with the Modern Structural Steel Co., of Waukesha, Wis. The Clinton Bridge & Iron Works, Clinton, Ia., will fabricate 230 tons of steel for a bridge at Ventura, Cal., and Milliken Bros. will supply 300 tons for a hotel for the Cyprus Lawn Cemetery Association, of San Francisco. The Chicago Railways Co. will award 400 tons to the South Halstead Street Iron Works. Jones & Laughlin took the order for 600

tons of track angles for the Chicago, Milwaukee & St. Paul road. Orders for plain structurals being received by local mills continue very good, particularly from the fabricating shops and from the Bettendorf company. With regard to prices, the market on plain shapes is reported surprisingly firm considering the competition for fabricated material. For mill prices on structural steel, see Pittsburg report. Freight to Chicago, 18 cents. We quote for delivery from local jobbers stocks as follows:

All angles, 3 inches and larger, including 6 inches, $1.70 per 100 pounds; angles over 6 inches, $1.80 per 100 pounds, base; beams, 3 to 15 inches, inclusive, $1.70 per 100 pounds, base; channels, 3 inches and larger, $1.70 per 100 pounds base. Less than carload lots are $1 a ton higher than foregoing prices.

Rails and Track Supplies.—There are evidences of considerable quiet buying on the part of railroads, which foresee that the present prices represent bargains. Developments also indicate that the railroads do not expect lower rail prices. Some further tonnages were received during the past week totaling about 16,000 tons. Among these orders were 6,000 tons for the Soo line and 5,000 tons for the Northern Pacific. Specifications for spikes and bolts are coming forward in good volume and the mills are well provided for in this respect. At Gary, the rail mill is operating steadily, though not to full capacity. Seven open-hearths are supplying steel and the firing of another will probably be necessary in the near future. For standard sections, see Pittsburg report. We quote as follows:

Light rails, 25-pound to 45-pound, $25; 20-pound, $26; 16-pound, $27; 12-pound, $28. Track supplies, f. o. b. Joliet, angle bars, 1.50c to 1.60c; spikes, 1.80c to 1.90c; track bolts, with square nuts, 2.15c to 2.20c; with hexagon nuts, 2.30c to 2.40c. Small railroad and square boat spikes, 1.90c base, f. o. b. Chicago.

Merchant Pipe and Boiler Tubes.—A review of the tonnage developed since the reduction in prices shows some increase over previous periods, but the trade does not show any animation. Irregularities in tube prices continue to exist, though not to a pronounced degree. For mill discounts see Pittsburg report. Freight to Chicago, 18 cents.

Cast Iron Pipe.—The letting of the San Francisco tonnage is still being held in abeyance pending an agreement between the railroads and the city as to freights. A rate of $12 has been offered and $10 is asked. The Bay City, Mich., contract for 300 tons was placed with M. J. Drummond and the price was about $24 a ton delivered. A contract for 1,500 tons of 4-inch, 6-inch and 12-inch pipe for Milwaukee was taken by the Lynchburg Foundry Co. Toledo, O., will be in the market March 25 for 600 tons and Cheyenne, Wyo., April 5, for 10,000 tons. A small order is to be placed at Richmond Center, Wis., on April 9. Prices are slightly softer in keeping with the pig iron situation and we quote as follows: 4-inch water pipe, $27.50; 6 to 14-inch, $26.50; larger sizes, $25.50; gas pipe, $1 a ton higher.

Wire Products.—The wire trade is enjoying a very good trade enhanced by the beginning of warm weather in the south. For the next few weeks prior to the time when the soil will require attention, the demand for wire nails and fence wire which is now particularly good will so continue. The leading interest has accumulated considerable stocks at advantageous points and its sales are being increased by the ability to ship at once. We quote as follows:

Wire nails, jobbers carload lots, $2.13; retailers' carload lots, $2.18; painted barb wire, jobbers' carload lots, $2.28; retailers' carload lots, $2.33, with 30c for galvanizing; plain wire to jobbers in carloads, $1.98, and to retailers in carloads, $2.03. Wire rods, Bessemer, $33; open-hearth, $34; chain rods, $33, f. o. b. Pittsburg.

Old Material.—A mixed sentiment prevails with regard to the scrap market. In some quarters, the tone of the market is considered improved and one hears $13.50 quoted for re-rolling rails and $12.50 for No. 1 cast. Ths cannot be considered general, however, and mill scrap is undeniably dull. Several offers for re-rolling rails have been made and one tonnage was bought for local delivery. There is some inquiry for melting steel and the spread between cast scrap and pig iron has induced some interest in that drection. An offer of $16.25 delivered East Chicago was made on old iron rails and better than that has been done. The Chicago, Burlington & Quincy offers a list of 3,000 tons the principal item of which is 500 tons of re-rolling rails. We have revised our prices and quote gross tons in the first paragraph as follows:

Old car wheels	$14.00 to 14.50
Old iron rails	15.75 to 16.25
Re-rolling rails (4 ft. and over)	12.75 to 13.25
Old steel rails (4 ft. and under)	13.50 to 14.00
Light section relayers, 45 lbs. and under, subject to inspection	21.00 to 23.00
Relaying rails, subject to inspection	19.00 to 19.50
Frogs, switches and guards	12.25 to 12.75
Heavy melting steel	12.00 to 12.50

We quote, net tons, as follows:

No. 1 R. R. wrought	$11.25 to 11.75
No. 2 R. R. wrought	10.25 to 10.75
Knuckles, couplers and springs	11.00 to 11.50
Shafting	15.25 to 15.75
Iron car axles	16.00 to 16.50
Steel car axles	15.75 to 16.25
Dealers' forge No. 1	9.50 to 10.00
Pipes and flues	8.50 to 9.00
No. 1 cast, 150 lbs. and less	12.00 to 12.50
No. 1 mill	7.00 to 7.50
Mixed busheling (Nos. 1 and 2)	7.00 to 7.50
Country sheet	5.00 to 5.50
No. 1 boiler cut	9.00 to 9.50
Boiler punchings	11.00 to 11.50
Cast borings	7.00 to 7.50
Mixed borings, etc	7.00 to 7.50
Machine shop turnings	6.50 to 7.50
Railroad malleable	10.50 to 11.00
Agricultural malleable	10.00 to 10.50
Stove plate and light cast scrap	11.00 to 11.50
Old iron splice bars	13.50 to 14.00

CLEVELAND.

Fair Business in Finished Materials—Pig Iron Very Dull.

Office of THE IRON TRADE REVIEW,
Browning Building, March 23.

Iron Ore.—The action of the ways and means committee in reporting the Payne bill, providing for putting ore on the free list, has aroused some discussion as to the probability of ore prices being lower. While the tendency of the tariff bill may delay the fixing of prices, Lake Superior iron ore interests are not at all inclined to make any concessions from last year's quotations.

On base ores with the guarantee of 55 per cent on old range and Mesabi Bessemer and 51½ per cent on old range and Mesabi non-Bessemer, we quote as follows: Old range Bessemer, $4.50; Mesabi Bessemer, $4.25; old range non-Bessemer, $3.70; Mesabi non-Bessemer, $3.50.

Pig Iron.—In Cleveland and vicinity, the market is extremely dull, there being neither sales nor inquiries of any amount. Some Cleveland agencies, however, having furnaces in other states, report very fair inquiry, some buyers desiring to order several thousand tons. We quote delivered in Cleveland as follows:

No. 1 foundry	$15.75 to 16.25
No. 2 foundry	15.25 to 15.75
No. 3 foundry	14.75 to 15.25
No. 2 southern	15.35 to 15.85
Gray forge	13.75 to 14.00
Bessemer	16.50 to 16.75
Lake Superior charcoal	19.50 to 20.00
Jackson Co. 8 per cent silvery	20.05

Coke.—The Upson Nut Co. has not yet contracted for its second half requirements. Deliveries on contracts are being made with very satisfactory regularity. There is practically no new business. Spot furnace coke we quote at $1.50 to $1.75 at the ovens, and on contract, $1.75 to $1.90. For first class Connellsville foundry coke, we quote, on shipment up to the second half, $2.00 to $2.25.

Finished Material.—Despite all rumors of lower quotations on structural material, the market in this district is firm at $1.30 Pittsburg, and the order for the steel for the building for the Brotherhood of Locomotive Engineers, about 2,500 tons, has not yet been placed. The leading interest took a contract for 800 tons of reinforcing bars for the city filtration plant at Evansville, Ind., and is figuring on 800 tons for the Nearing building, Toledo. The same interest also took the contract for 255 tons of shapes for the Rocky River bridge, and has had a very fair amount of miscellaneous business during the week. The Empire and Union rolling mills are in operation this week. The very active competition in finished lines heard of in some parts of the country, resulting in the cutting of prices, does not prevail in this district.

Old Material.—While little additional material has actually passed between buyer and seller the past week, yet the downward price tendency which has been a feature of the market for the past two months has been checked, at least temporarily. One of the largest railroad lists offered by the Lake Shore in months closed the past week at fair prices. We continue to quote f. o. b., Cleveland, as follows:

Old iron rails	$16.00 to 16.50
Old steel rails (re-rolling)	14.00 to 14.50
Old steel rails (under 6 feet)	14.00 to 14.50
Old car wheels	14.50 to 15.00
Old steel boiler plate	11.00 to 11.50
Malleable iron (railroad)	13.50 to 14.00
Steel axles	17.50 to 18.00
Malleable iron (agricultural)	12.00 to 12.50
Heavy steel	12.50 to 13.00
Country mixed steel	11.00 to 11.50
Low phosphorus	16.00 to 16.50

We quote, net tons, as follows:

No. 1 R. R. wrought	$13.50 to 14.00
No. 1 busheling	10.50 to 11.00
No. 1 machine cast	12.50 to 13.00
Iron axles	17.00 to 17.50
Axle turnings	9.50 to 10.00
Machine shop turnings	7.50 to 8.00
Grate bars	11.00 to 11.50
Pipes and flues	10.50 to 11.00
Tank iron	9.00 to 9.50
Hoop and band iron	7.00 to 7.50
Sheet iron	5.50 to 6.00
Wrought drillings	7.50 to 8.00
Stove plate	11.00 to 11.50
Cast borings	6.00 to 6.50

CINCINNATI.

Inquiry is Light and Prices are Weak for Pig Iron.

Office of THE IRON TRADE REVIEW,
First National Bank Bldg., March 23.

Pig Iron.—But little change can be noticed in the situation this week compared with the preceding week. The quotation established for southern iron of $11.50 Birmingham has become more general. Some of the southern producers are declining to follow the market and others, while willing to take prompt shipment business at $11.50 Birmingham, are carefully guarding against making commitments for future deliveries at this price and so far as can be learned the quotation does not extend beyond the second quarter. It is reported that some southern producers have taken some business for the remainder of the year at $12 Birmingham.

Inquiry is light and mostly for small lots for prompt shipment and it may be expected that hand to mouth buying will increase as the first quarter draws to a close and first quarter contracts are worked out. Northern iron is not quotably changed and is regarded as weak at $14.50 for No. 2 foundry at southern Ohio furnaces. There have been no tonnage offerings to seriously test the southern Ohio furnaces, but trade opinion is that for a round lot $14 to $14.25 could be done. Cast iron pipe makers are testing the market on southern iron and some offers have been made on low grades which as yet have not been accepted. The bulk of the inquiry is for small lots, nothing over 200 tons is reported.

We quote for prompt shipment based on freight rates of $3.25 from Birmingham and $1.20 from Ironton district, delivered Cincinnati, as follows:

Southern foundry No. 1	$15.25 to 15.75
Southern foundry No. 2	14.75 to 15.25
Southern foundry No. 3	14.25 to 14.75
Southern foundry No. 4	13.75 to 14.25
Southern No. 1 soft	15.25 to 15.75
Southern No. 2 soft	14.75 to 15.25
Southern gray forge	13.25 to 13.50
Northern No. 1 foundry	16.20 to 16.70
Northern No. 2 foundry	15.70 to 16.20
Northern No. 3 foundry	15.20 to 15.70
Northern 8 per cent silicon	19.70

Finished Material.—Specifications on contracts are fair and a few orders are being taken at the declines recently established. Sales are mainly on a basis of $1.20 Pittsburg for steel bars, $1.30 Pittsburg for plates and structural, and $1.60 Pittsburg for hoops. Retail business is moderate and store prices are fairly well maintained with some adjustments made, based on the new carload schedule.

Coke.—Some foundry contracts are being renewed for desirable brands, but the call for coke continues moderate and in about the same volume as in the recent past. Quotations given below represent the range for prompt shipment and contract prices, the inside prices representing prompt shipment, and the top prices contract figures for forward delivery:

	PER TON.
Wise county furnace coke	$1.60 to 1.90
Wise county foundry coke	2.00 to 2.25
Pocahontas furnace coke	1.65 to 1.85
Pocahontas foundry coke	1.85 to 2.25
Standard Connellsvills furnace coke	1.50 to 2.00
Standard Connellsville foundry coke	1.90 to 2.50

Old Material.—Since the decline in prices, there has been some increase in the demand for scrap and sales have been more numerous. The market continues irregular and difficult to quote, as each transaction is practically a matter of negotiation. The following quotations represent the dealers' asking prices:

Old No. 1 R. R. wrought, net tons	$13.50 to 14.00
No. 1 machinery, net tons	13.00 to 13.50
Old iron rails, gross tons	15.50 to 16.50
Old steel rails (re-rolling) gross tons	12.50 to 13.50
Old short lengths, gross tons	12.00 to 13.00
Old iron axles, net tons	15.00 to 16.00
Heavy melting scrap, gross tons	12.00 to 12.50
Stove plate, net tons	10.00 to 10.50
Heavy turnings	7.00 to 7.50
Cast borings, net tons	4.00 to 5.00
Car wheels, gross tons	13.50 to 14.50

PHILADELPHIA.

Curtailment of Pig Iron Production Expected—Markets Dull.

March 23.

Pig Iron.—From all indications, there will probably be a considerable curtailment of production by merchant furnaces within the early future. Pending the meeting of the eastern association late this week, it is impossible to state accurately whether production is now exceeding shipments, but it is known that the decrease in orders on hand has reached such a stage that stocks on furnace yards are certain to accumulate from now on, unless a number of stacks blow out or an immediate buying movement sets in. The latter is extremely improbable, and there is every reason to expect that, as fast as ore supplies can be used up, furnaces in this section will go out and stay out until there is a certainty that their output can be disposed of. Already a number of the larger interests are preparing to reduce their production, in most instances by about one half, but this action will string out over a considerable period, as ore supplies in some cases will last up until June. The past week has been as quiet as at any time for several weeks past, practically the only buying being by pipe interests, which took in the aggregate a few thousand tons, mostly of southern product, and by foundry concerns which took a few small lots for immediate requirements. Southern iron is coming into this district, owing to the recent drop to a Birmingham basis of $11.50 for 2 foundry. Northern 2X can be had at $16.25, delivered at eastern Pennsylvania plants, provided any attractive tonnage is involved, and 2 plain has sold as low as $15.75. There is absolutely no activity in steel-making irons, and several steel interests have recently asked for suspended or delayed shipments; basic iron can be had at $15.50, delivered, but the steel

plants are not buying even at this low figure. The general feeling seems to be that the proposed tariff reduction on pig iron from $4 to $2.50 per ton is more severe than was necessary; should it be contained in the measure as finally adopted, it will affect this district probably more keenly than any other iron producing district. The following quotations are for delivery at eastern Pennsylvania plants, but in several instances are nominal, as in the case of low phosphorus iron, of which there have been no sales for several weeks:

No. 1X foundry	$16.75 to 17.00
No. 2X foundry	16.25 to 16.50
No. 2 plain	15.75 to 16.00
Standard gray forge	15.00 to 15.50
Basic	15.50 to 16.00
Low phosphorus	21.50
No. 2 Birmingham	15.75 to 16.25
No. 2X Virginia	16.50 to 17.00
No. 2 plain Virginia	16.00 to 16.50

Finished Materials.—New bids have been called for on the Queen Lane filtration project, a municipal proposition requiring about 250 tons of steel and close to 2,000 tons of steel bars. The Cambria Steel Co. will furnish the plain material, about 1,000 tons, for the state tobacco warehouse at Baltimore, the contract for which was recently taken by the Baltimore Bridge Co. Bids close late this week on the Curtis building, calling for 15,000 tons of steel, and plans are now being circulated for the extension to the Real Estate Trust Co., requiring about 500 tons of steel. The Reading track elevation project will probably be let in the early future. No other wage reductions have been announced, other than that of the Cambria Steel Co., which becomes effective April 1, but the other larger interests will doubtless take similar action. On plain material prices are well maintained, a lot of 1,000 tons of structurals sought by a local jobber, brought no figures below the 1.30, Pittsburg, base. We quote: Structural shapes, 1.45c to 1.55c; plates, 1.45c to 1.50c with usual extras; steel bars, 1.35c to 1.40c; refined bar iron, 1.35c to 1.45c.

Old Materials.—There has been a little buying of heavy melting steel at $14 delivered, the same figure at which a 1,000-ton lot was sold the previous week, but this is about the extent of current transactions. With one or two exceptions, mills are not covered far into the future and are evidencing more willingness to buy. The railroad lists are well disposed of, only the rail offerings not being placed. Scrap is accumulating slowly and is almost all in strong hands. We quote, gross tons, eastern Pennsylvania delivery, as follows, but they are largely nominal figures:

Old steel rails (re-rolling)	$15.75 to 16.25
No. 1 steel scrap	13.75 to 14.25
Old steel axles	17.00 to 17.50
Old iron axles	20.00 to 21.00
Old iron rails	16.50 to 17.00
Old car wheels	14.25 to 14.75
Choice scrap R. R. No. 1 wrought	15.00 to 15.50
No. 1 yard scrap	13.00 to 13.50
Machinery scrap	14.00 to 14.50
Low phosphorus scrap	17.00 to 18.00
Wrought iron pipe	13.50 to 14.00
No. 1 forge fire scrap	11.75 to 12.25
No. 2 forge fire scrap, ordinary	7.00 to 8.00
Wrought turnings	9.75 to 10.25
Axle turnings, heavy	11.00 to 11.50
Cast borings	8.00 to 8.50
Stove plates	11.75 to 12.25

ST. LOUIS.

Few Orders for Pig Iron and Prices are Weak.

March 22.

Pig Iron.—Not very many orders for pig iron were received in the St. Louis territory last week, and inquiries remained about the same. Some few inquiries reported the previous week were withdrawn, but the gaps were filled by new ones, aggregating from 2,000 to 3,000 tons for all deliveries. Some dealers assert that pig iron can be bought as low as $11 for No. 2, Birmingham basis, but most furnaces are holding out for $11.50 to $12 for immediate and future shipments. One large concern offered $10.50 for No. 2, Birmingham, on 1,000 tons, giving the furnace the privilege of shipping all before July 1, or distributing it over the last half of the year, but the offer was declined. One order for 200 was booked at $11.50 for delivery over the third quarter.

Our quotations, delivered, to which the freight of $3.75 from Birmingham has been added, follow:

No. 1 southern	$16.25 to 16.75
No. 2 southern	15.75 to 16.25
No. 3 southern	15.25 to 15.75
No. 4 southern	14.75 to 15.25

Coke.—The best selected 72-hour Connellsville foundry coke continues to be held at $2.15 to $2.25, ovens, but some high sulphur grades can be bought at $1.90 to $2. The price on Virginia and West Virginia grades is unchanged. The freight to East St. Louis and St. Louis from Connellsville and the Virginia fields is $2.80, and $2.70 from the Virginia fields when the shipment is destined beyond St. Louis.

Old Material.—Scrap iron quotations remain at the following figures, with the market dull:

Cast iron borings, free from foreign material, net tons	$ 6.00
Steel axle turnings, gross tons	12.00
Steel railroad axles, net tons	17.50 to 18.50
Iron railroad axles, net tons	19.00 to 20.00
Miscellaneous steel scrap, gross tons	12.50 to 13.00
Old car wheels, gross tons	16.00
No. 1 railroad cast scrap, net tons	12.00 to 12.50
Heavy machinery cast, net tons	13.00 to 14.00
Stove plate and light cast, net tons	11.50
Sheet iron, net tons, uncut	5.00
No. 1 railroad wrought, net tons	13.00 to 13.50
Railroad malleable, net tons	12.00 to 12.50
Heavy melting steel, net tons	13.00 to 13.50
Relaying rails, net tons	17.00 to 18.00

BUFFALO.

Very Little Business in Pig Iron and Conditions Depressing.

Office of THE IRON TRADE REVIEW, 932 Ellicott Square, March 23.

Pig Iron.—There is very little action in pig iron and the general tone is dull and depressing. No change is announced in quotations. A price of $15.75 to $16.25 for No. 2 foundry best indicates the basis of prices, but there is about $1 difference between prompt and forward delivery, although little selling is reported for prompt delivery. We quote f. o. b. Buffalo as follows:

No. 1X foundry	$16.25 to 16.75
No. 2X foundry	15.75 to 16.25
No. 2 plain	15.25 to 15.75
No. 3	15.00 to 15.50
Malleable Bessemer	16.50 to 17.00
Gray forge	14.75 to 15.25
Charcoal	20.50 to 21.00

Finished Products.—Closings the past week were substantially better than for previous periods, the more notable transactions being orders placed by the Buffalo Copper & Brass Foundry Co. with the Buffalo Structural Steel Co. for 130 tons of structural. The same firm, on another low bid, was also given an order by the Frontier Iron Works of Buffalo for 175 tons of structural material for extending its plant. The Monarch Engineering Co. has placed an order with Carnegie interests for 250 tons of reinforcing bars. Several good prospects are under way.

BIRMINGHAM, ALA.

Big Tennessee Plant Will Close—Pig Iron Market Dull.

March 22.

The manufacturers of pig iron in the Birmingham district or in the southern territory are not selling their make by any means. There is a little iron selling, but the orders are in small lots and far between. The quotations are weak. While $12 per ton, No. 2 foundry, is the regular price that is to be heard, some iron is being sold in this territory at $11.50 and even lower. Two or three furnace companies are not pushing the market at all, waiting for some sort of improvement. There is a pessimistic feeling prevalent in this territory. Many letters are being written to the representatives in congress protesting against the proposed revision in the tariff as far as iron and coal goes and many conjectures are being offered as to what will happen when the duty is reduced on the commodities named. There has been a reduction in the make in this territory, two furnaces being shut down. While

the statement is made that repairs are necessary about the furnaces, the shutdown is part of a plan to curtail the production until conditions improve.

Further curtailment is to take place in the near future, among other shutdowns looked for on or shortly after April 1 being the big steel plant of the Tennessee Coal, Iron & Railroad Co., a subsidiary company of the United States Steel Corporation. A report from New York has the plant shutting down positively, together with six blast furnaces. F. H. Crockard, vice president of the Tennessee company, when seen, after his return from New York where he conferred with high officials of the United States Steel Corporation, declined to make any statement. The plant at Ensley gives employment to a couple of thousand men.

NEW YORK.

Pig Iron Dull and Prices Low—Considerable Railway Bridge Work.

Office of THE IRON TRADE REVIEW,
Room 1005, No. 90 West St., March 23.

Pig Iron.—Scattered lots of foundry iron for quick shipment, ranging generally from car lots to 100 tons, are making up the bulk of the limited business now current. Occasionally an inquiry of some size develops, one from the General Electric Co. for 1,000 tons now being in circulation, but for the most part the larger inquiries are put out merely as market feelers, as was the case with a call for tenders on 16,000 tons of pipe-making irons sent out recently. What little business there is going is still confined to New England, where melters seem to be a trifle better supplied with orders, as now and then a request is received for the resumption of shipments on a contract on which a suspension has been secured. Prices are somewhat easier. On southern product, $11.50 is the market basis, and on some speculative iron this figure has been shaded. Virginia iron ranges from $14.00 to $14.50, furnace, though the McHarg interests, with large accumulations, are holding firmly for $15.50. Pennsylvania furnaces are asking from $15.50 to $15.75, furnace, but are unable to take much New England business in competition with Buffalo producers and other furnaces in that district. The pig iron trade is considerably concerned over the probable effect of the proposed reduction in scrap duty from $4 to 50 cents per ton; it is felt that this is an excessive reduction and may result in large quantities of scrap being imported in direct competition with eastern pig iron. We quote, second quarter delivery at New York tidewater, as follows:

Northern foundry No. 1	$16.50 to 17.00
No. 2X foundry	16.00 to 16.50
No. 2 plain	15.50 to 16.00
No. 2 southern foundry	15.75 to 16.25
Malleable	17.25 to 17.75
Basic	16.00 to 16.50
Gray forge	15.25 to 15.75

Ferro-Alloys.—An inquiry for considerable in excess of 1,000 tons of ferro-manganese for western delivery has been in circulation, but has been withdrawn, and the market is again featureless with a nominal quotation of $42, seaboard. Ferro-silicon is quiet on the level of $60, Pittsburg.

Finished Material.—Activity in the structural trade is chiefly confined to railway bridge work. Bids are to go in the last of this week on another lot of the Vanderbilt lines' requirements, which aggregate some 35,000 tons, divided as follows: New York Central, 10,000 tons terminal buildings in this city and 15,000 tons of bridge work over the system; Lake Shore, 8,000 tons; Nickel Plate, 1,000 tons; Michigan Central, 1,400 tons, and Big Four, 700 tons. The American Bridge Co. has formally entered the orders for the bridge requirements of the Northern Pacific and the Great Northern, 8,000 tons for the former and 2,000 tons for the latter.

The American Bridge Co. secures the Ball Realty building, this city, 1,800 tons. It will probably take 2,000 tons. Milliken Bros. received about 600 tons additional work for the Atlas Portland Cement Co.

The Missouri Pacific is in the market for 7,000 tons of bridge work; the Norfolk & Western has 1,500 tons in prospect, and the Erie is asking bids on about 5,000 tons. The Chicago & Northwestern requirements, between 9,000 and 10,000 tons, have been taken out by the American Bridge Co., which has just secured the contract for 2,000 tons of steel for a pier shed of the Royal Mail line at Pier 42, North River. The McHarg-Barton Co. has been awarded the city pier shed contract, but has not placed the steel contract. New York engineers are preparing plans for a public bridge at St. Louis, but this will not come into the trade for some time. The Bethlehem Steel Co. will furnish the steel for the Gimbel store building in this city, but the fabricating will be done by the receivers of Milliken Bros., Inc. More than 12,000 tons of steel will be required, of which all but the channels will be Bethlehem sections. The Hay Foundry & Iron Works will supply 450 tons of steel for the Firemen's Insurance building in Newark, N. J.; one contract for a 2,000-ton telephone building in that city, went to Post & McCord, and an early beginning of the construction work is expected on the Prudential Life extensions there, for which the American Bridge Co. is to furnish 8,000 tons of steel under a contract closed several months ago. Ravitch Bros. have taken a local contract involving 850 tons of steel. Two Reading, Pa., contracts have been closed recently, one calling for 2,000 tons for Reading Iron Co. improvements taken by the Pennsylvania Steel Co., and the other a 1,500-ton power plant, taken by the Phoenix Iron Works. Prices continue low on fabricated material. The Cornell failure did not come as an entire surprise to the trade and has no important bearing on the situation. The receivers of Milliken Bros. have secured about 500 tons of bridge work on the New Haven and have taken a small sugar mill project in Porto Rico. Rail orders not previously announced include 10,000 tons for shipment to Argentine Republic, secured by the Pennsylvania Steel Co. Inquiries from that country are for 50,000 tons. A fair tonnage is under inquiry for export to Cuba and South America. The Chicago City railways is reported as in the market for 22,000 tons of girder rails. Practically no business is reported on billets or bars, and we quote:

Angles, 3 to 6 inches, x ¼-inch and heavier, 1.46c; beams, 3 to 15 inches, 1.46c; tees, 3 x ¼-inch and heavier, 1.51c; plates, carloads, tanks, 1.46c; marine boilers, 1.86c; bar iron, 1.35c to 1.40c; soft steel bars, 1.36c; sheets, No. 28, black, 2.56c.

Cast Iron Pipe.—The leading interest has booked a 300-ton order from Syracuse, and Orange, N. J., has opened bids on 150 tons. Practically no new business is developing and very low prices are being made on what is current. The big Cheyenne letting has been postponed to April 5.

Old Material.—The feature of the market is an inquiry now in circulation for 1,000 tons of heavy cast scrap, with the exception of which the situation is almost lifeless and prices are generally lower. In case the proposed reduction in the scrap duty is adopted, well informed factors in the trade say it will not have a very important effect. Old rails, car wheels and heavy steel scrap may be brought in in small quantities, but these are about the only lines which could be bought with any certainty that they would prove acceptable and would stand the sea voyage. The trade has had some

experience with scrap purchases abroad and knows that wholesale rejections of material have been met in efforts at the importation of most lines. We quote, gross tons, New York delivery, as follows:

Old steel rails (re-rolling)	$13.50 to 14.50
Relaying rails	19.00 to 19.50
Old car wheels	12.50 to 13.00
Old iron car axles	15.00 to 15.50
Old steel car axles	12.50 to 13.00
Heavy melting steel	10.75 to 11.25
No. 1 railroad wrought	13.50 to 14.00
Iron track scrap	12.50 to 13.00
Wrought pipe	10.00 to 10.50
Cast borings	5.50 to 6.00
Wrought turnings	8.00 to 8.50
Heavy cast scrap	12.50 to 13.00
Railroad malleable	12.50 to 13.00
Stove plate	9.50 to 10.00
Grate bars	8.50 to 9.00

BRITISH IRON MARKET.

Extensive Naval Program Encourages Steel Makers—Pig Iron Dull.

Prince's Chambers, Corporation St., Birmingham, Eng., March 13.

The naval program issued today, providing for increased expenditure on battleships, has given a little encouragement to Sheffield steelmakers. The new vessels comprise four battleships of the Dreadnought type, six protected cruisers, 20 destroyers, and a number of submarine boats. A good deal of this building steel must come from Sheffield, and besides this the steel center has more work in prospect than for a long time past. In addition, some government orders have been given out for tool steel. In Sheffield generally, there is a feeling that a higher duty will be imposed by Americans on high speed steel, because the claims recently advanced for the Sheffield articles are understood to have alarmed American manufacturers.

Pig Iron.—There is no improvement to record, as compared with a week ago. Whatever change has taken place is in the downward direction. In the Cleveland district, the price of pig iron has fallen by about 6d, yesterday's quotation being 46s 8d ($11.42) for No. 3., with 47s 4d ($11.58) for three months. Hope seems to spring eternal in the human breast, to judge by the persistence with which forward buying is still associated with slightly higher prices. Stocks have increased rather less than for some time, the reason apparently being that certain branches of iron and steel are consuming a little more, but there are reported to be considerable stocks in makers' hands and the present amount in store, which is 185,000 tons, is practically an increase of 100,000 tons on the total of a year ago. Quite commonly, there is increased activity at this period, which is now totally absent. The effect is to discourage buyers from entering into future engagements, and only immediate needs are met. Hematite on the East coast is practically unchanged, with mixed numbers at 55s ($13.40). The Midland district is a little more successful in resisting outside depressing influences, but the business actually done has only been possible on reduced terms, the fall being from sixpence to a shilling.

METAL MARKET

NEW YORK.

March 23.

Copper.—Reports of heavy selling in the local market on Monday sent prices up snarply and gave the situation a stronger tone. Most of the business reported was in electrolytic in sales of several million pounds. We quote: Lake 12⅝c to 12⅞c; electrolytic 12¼c to 12½c; casting 12⅛c to 12⅜c.

Pig Tin.—There has been considerable spot material pressing for sale and the local market has been dull and quiet in consequence, selling continuing at the same level, 28¼c to 28½c. The situation abroad is not so strong.

Pig Lead.—The lower priced offerings seem to be well cleared out and the market is fairly strong, though quiet, at 3.97½c to 4.02½c, New York.

Spelter.—The situation is featureless and business is light, consumers being well supplied. Current selling is at 4.75c to 4.77½c.

Antimony.—Cookson's 8c to 8⅛c; Hallett's 7⅞c to 8c; ordinary brands 7⅜c to 7⅝c.

CHICAGO.

March 23.

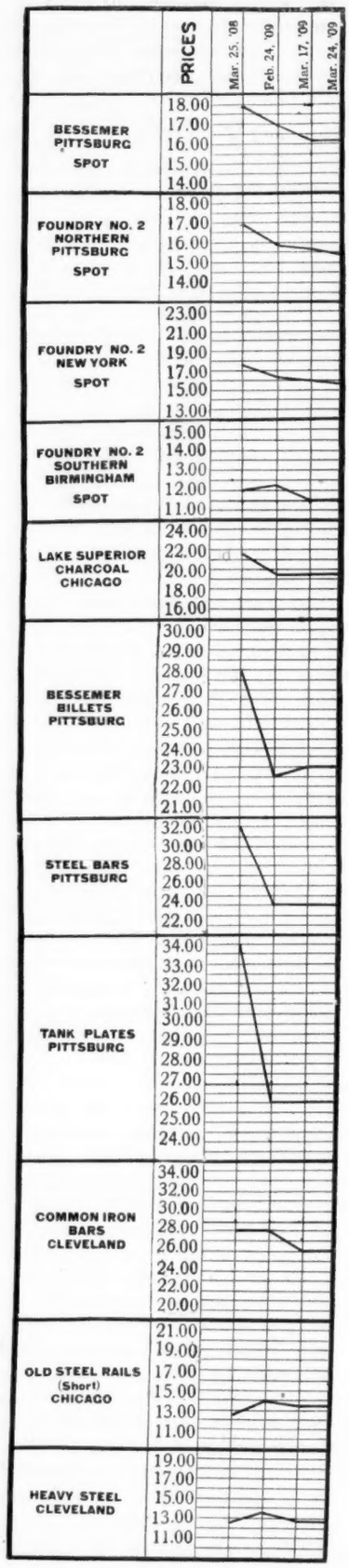
The general tone of the metal market is better. In large quantities advances are noted in prices of copper, tin and spelter. Lead is less active. We quote for small lots as follows:

Lake copper, carload lots, 13¼c to 13½c; castings, carload lots, 13c to 13¼c; pig tin, 31c; spelter, 4.90c to 5c; pig lead, desilverized, 4c to 4.10c in 50-ton lots; corroding, 4.65c to 4.70c in 50-ton lots; car lots, 2½c per 100 pounds higher; sheet zinc, 6¾c list f. o. b. LaSalle in car lots of 600-pound flasks; Cookson's antimony, 10½c to 11c; other grades, 10c.

The scrap metal business continues dull.

Copper wire, 11¼c; heavy copper, 11c; light copper, 10¼c; heavy red brass, 10¼c; heavy yellow brass, 8¼c; light brass, 6c; No. 1 red brass borings, 8½c; No. 1 yellow brass borings, 7½c; brass clippings, 8c; tea lead, 3⅛c; lead scrap, 3.50c; zinc, 3.25c; tin pipe, 24c; tin foil,

PRICE CHART.



22½c; pewter, 17c; electrotype plates, free from wood, 3.75c; electrotype dross, 2.60c; stereotype plates, 4c; stereotype dross, 3.75c; prime slab zinc dross, $45 per ton.

ST. LOUIS.

March 22.

Lead and Zinc.—Purchases of zinc ore in the Missouri-Kansas district in the early part of last week were made at from $34 to $37 a ton, but the price quickly rose to $37.50 and $38 when it was announced that the ways and means committee of the house had recommended a duty of 1 cent on every pound of imported zinc. The best base price paid for 60 per cent zinc was $38, and $52 a ton was paid for 80 per cent lead. The bulk of the lead, however, did not command more than $50 and $51 base. Extensive operations were conducted in the sheet ground portions of the district during the week, and taken altogether there was more activity in mining than has been manifested for some time.

St. Louis pig lead was somewhat stronger at $3.97½. Spelter was stationary at $4.65. New York pig lead was stronger at $4.02½, and spelter was stationary at $4.77½. Calamine sold for $19 base, with a high price of $23.

Entertains Engineers.—The Mesta Machine Co., Pittsburg, will entertain the Engineers' Society of Western Pennsylvania and friends Saturday afternoon, March 27, when an inspection of its enlarged works at West Homestead, Pa., will be made. The operations of various departments will be shown the visitors. A special train to carry the large crowd of visitors which promises to be present will leave the union station, Pittsburg, at 2 p. m., arriving at the works at West Homestead at 2:20 p. m. A special train returning will leave the works at 5:30 p. m.

Receivers Appointed.—Howard H. Dickey, Lloyd Lowndes and Henry Shriver have been appointed receivers for the Maryland Rail Co., manufacturing light rails, at Cumberland, Md. Principal creditors are given as the Continental Iron & Steel Co., $20,000; Joseph Joseph Bros. Co., $18,000, and Charles Dreyfus Co., $14,000. This company leased the Cumberland rolling mill, which was equipped for rerolling steel rails up to 40 pounds, the annual capacity being 60,000 tons. The company maintains New York offices at 1123 Broadway, Mr. Dickey being president.

PRESIDENT COLE RESIGNS.

The resignation of Thos. F. Cole as president of the Oliver Iron Mining Co. was announced last week. Mr. Cole is to be succeeded in the presidency by W. J. Olcott, who as vice president, has been actively in charge of operations for some time past. Mr. Olcott, who was also president of the Duluth, Missabe & Northern railroad, has resigned from that office and will be succeeded by Vice President W. A. McGonagle, in whose charge the operation of the road has been. The resignation of J. B. Cotton, who has been general solicitor for the Steel Corporation in Duluth, was also announced. Mr. Cotton will open law offices in Duluth and will practice along the lines of railroad, mining and corporation law.

For a considerable time past, Mr. Cole has been desirous of relief from the duties connected with the presidency of the Oliver Iron Mining Co. In the 39 consecutive years during which he has been associated with iron and copper mining in the Lake Superior district, his personal interests have greatly increased in copper. With this increasing burden added to the conduct of the Oliver Iron Mining Co., for the operating organization of which Mr. Cole is chiefly responsible, the pressure of his duties has been exceedingly heavy. It is to find a partial relief from this and to devote himself entirely to his varied copper interests that Mr. Cole has finally determined to withdraw from the Steel Corporation. Mr. Olcott, who succeeds him, has been with the Oliver Iron Mining Co. since the absorption of the Lake Superior Consolidated Iron Mines, of which he was general manager.

New Pattern Concern.—A partnership has been formed by F. W. Fretter and A. G. T. Smith, known as the Interstate Pattern Co. to manufacture patterns for all classes of foundry work. Mr. Fretter was formerly with the Bruce-Meriam-Abbott Co., and Mr. Smith was formerly manager of the Great Lakes Pattern Co., both of Cleveland. The new company has a fully equipped shop at 5122 St. Clair avenue, Cleveland.

Started Coal Plant.—The coal handling plant which the C. O. Bartlett & Snow Co., Cleveland, has installed for the Crow's Nest Pass Coal Co., at Michel, B. C., has been started up, and is now taking care of the company's entire output of coal. With 17 men in 12 hours, it is doing what formerly required 68 men 16 hours to do. The plant was installed under the direction of the Bartlett & Snow company, by general superintendent E. J. Neville, who gave his whole time to the work. The machinery was started without a bit of delay. It is the largest coal handling plant in Canada, and one of the most up-to-date plants in the world, having a capacity of 12 tons of coal a minute.

BASIC STEEL CO. IS INCORPORATED.

The incorporation papers of the Basic Steel Co., with a capital of $30,000; the T. & T. Metal Roofing Co., with a capital stock of $10,000; and the DeForest Sheet & Tin Plate Co., with a capital stock of $10,000, all of Niles, O., were recently filed at Columbus, O. The incorporators of all three companies are the same: Wade A. Taylor, Charles S. Thomas, W. R. Thomas, W. A. Hutchings and L. P. Gillmer. It is proposed that the Basic Steel Co. will manufacture open hearth steel to be rolled into sheet bars, which will then be worked out in the other two subsidiary companies. Mr. Taylor was at one time interested in the Empire Iron & Steel Co., operating sheet mills at Niles. Charles S. Thomas is a practical sheet maker. The announcement is made that the basic steel plant will not be built this year, but construction on the sheet and roofing mills is going forward.

In Receivers' Hands.—Receivers have been appointed by the federal court at New York for the J. B. & J. M. Cornell Co., of that city, with a plant at Cold Spring, N. Y. The company fabricates structural steel for bridges and buildings. The Bethlehem Steel Corporation and others have filed claims aggregating $46,375. Unsecured liabilities are said to be $500,000, bonds amounting to $600,000, and uncompleted contracts of $1,000,000. A. Gordon Murray and Michael Blake were appointed receivers. It is possible a reorganization may be brought about. The Cornell company was established in 1853, and was one of the very first to use structural steel for building material. It erected the Tower building, at 50 Broadway, nine stories, the first skyscraper down town.

New Sheet Plant Starts.—The first steel sheet was rolled at the plant of the Massillon Rolling Mill Co., Massilon, O., March 22, in the presence of the company. Three of the five mills were started auspiciously. In order to celebrate the event, the employes of the Canton Art Metal Co., which will receive its raw material from the new plant, were given a half holiday.

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THE STEEL CORPORATION'S SHOWING

Liberal extracts from the annual report of the United States Steel Corporation were given in these columns last week. What interests the trade more than any other feature at this juncture is the comparison of the showing just made with the showing made for the year 1907. It will be recalled that conditions were such that up to about Nov. 1, 1907, the corporation's production and earnings were materially larger than in the corresponding period in 1906, but that on account of the sudden change in conditions the two closing months of the year were relatively unfavorable, so that 1907, on the whole, made a showing not much different from that of 1906. The earnings showed an increase of about $4,000,000, while the ore mined showed an increase of nearly 2,000,000 tons. On the other hand there was a slight decrease in the production of pig iron, of steel ingots, and of finished steel products for sale. A comparison of the 1908 showing, therefore, with the report for the calendar year 1907, is substantially a compromise also with 1906, but is not an exact comparison with the results of the first 10 months of 1907.

Making all comparisons between the full calendar years 1908 and 1907, it is to be noted that 1908 "earnings" were $91,847,710.57, or 57.1 per cent of the 1907 earnings, which were $160,964,673.72. These, however, were not "net earnings" as the latter are not so designed until there are deducted various appropriations. They are not "gross earnings," as they are not arrived at until various fixed charges have been deducted.

An approximation to "gross earnings" may be reached by adding to the "earnings" as reported the taxes paid and the interest on bonds and mortgages of subsidiary companies, together with interest on purchase money obligations, etc., of subsidiary companies. Adding these for 1908, it develops that gross earnings amounted to $104,610,075.95, which is 60.5 per cent of the corresponding amount for 1907, $172,850,793.09.

In the following table are given the principal statistics of the steel corporation for 1908, with the percentage which these figures constitute of the corresponding figures for 1907:

Items—	1908.	Percentage of 1907.
Gross receipts	$482,307,840.34	63.7
Gross earnings	$104,610,075.95	60.5
Earnings	$ 91,847,710.57	57.1
Manufacturing and producing cost and operating expenses	$367,735,102.27	65.2
Taxes	$ 5,361,160.20	99.6
Interest on subsidiary bonds, mortgages, etc.	$ 7,401,205.18	114.0
Administrative, selling and general expenses, etc.	$ 12,932,696.13	64.4
Salaries and wages paid	$120,510.829.00	74.9
Average number of employes	165,211	78.6
Total inventory	$143,179,629.00	105.1
Inventory value of ores	$ 65,783,209.00	111.5
Inventory tonnage of ores	.....	124.0
Lake Superior ore mined, tons	15,129,313	62.0
Southern ore mined, tons	1,533,402	97.3
Coke manufactured, tons	8,169,931	60.3
Blast furnace production, tons	6,934,408	60.7
Steel ingot production, tons	7,838,713	58.7
Steel products for sale, tons	6,206,932	58.8

The inventory tonnage of ore is not given above as it is not stated in the report, while the percentage of increase over 1907 is mentioned. There is a slight error on page 18 of the corporation's report, as it is stated that the inventory valuation of ore shows "an increase of only 13.5 per cent" from 1907. The increase is really 11.5 per cent, as the ore valuation is given as $58,984,718 on Dec. 31, 1907, and $65,783,299 on Dec. 31, 1908.

The gross receipts named above include "inter-company" business. It will be observed the 1908 total is 63.7 per cent of the 1907 total, showing a decrease of 36.3 per cent, while the total tonnage of steel products for sale decreased 41.2 per cent. This would indicate materially higher average prices per ton received in 1908 as compared with 1907, when it is known that prices in 1908 were lower, sheet products being reduced $2 to $4 a ton in January, 1908, and practically all other products except rails from $2 to $4 a ton in June. The divergence of the figures is due to the fact that the tonnage of some of the more expensive products decreased less, in 1908, than did the tonnage of some of the less expensive products, while there was a relatively smaller decrease in inter-company business. The total of finished steel products for sale decreased 41.2 per cent, but the rail tonnage in 1908 was 50,000 tons less, and the plate tonnage 215,000 tons less, than would be called for by a decrease of 41.2 per cent in the respective items. The tonnage of wire products, on the other hand, a high priced line, was 400,000 tons more than would be called for by a 41.2 per cent decrease, while the tonnage of sheets and tin plates was 140,000 tons in excess, these being also high priced products. They, in addition, contribute intercompany business, in sheet bars, and the tonnage is therefore represented twice in "gross receipts."

The effect of the policy of maintaining wages is seen in the fact that the total amount of salaries and wages paid decreased only 25.1 per cent, when tonnage decreased 41.2 per cent.

The report for 1907 specifically stated that the earnings of the Tennessee Coal, Iron & Railroad Co.

were included only for the two months, November and December, of that year. It did not define to what extent the operations of this company were included in the statement of "average number of employes in the service of all companies," but inasmuch as there was an increase of about 8,000 in the number of employes, from 1906 to 1907, when the tonnage of pig iron and steel production slightly declined, it is assumed that the inclusion was made for the entire year, so that the comparison in these items between 1907 and 1908 is not subject to an allowance on account of the Tennessee company acquisition.

The present report includes the production of the Tennessee company in the comparative figures for 1907, while that report did not include such production. By subtraction it is found that the production of the Tennessee company in 1907 was as follows:

	Tons.
Iron ore	1,576,757
Coke	1,170,826
Pig iron	602,827
Open-hearth ingots	243,444
Rails	146,171
Crude steel for sale	2,496
Plates	16,682
Merchant mill products	22,446
Total rolled steel	187,795

THE FIRST DRAFT OF THE NEW TARIFF.

The preparation of a tariff bill for the United States and its possessions, involving countless conflicting interests, is a monumental task, and he is inconsiderate and hasty who without careful consideration gives vent to sweeping denunciations of the product of many months of careful investigation and labor. The Payne bill has been presented to the house of representatives, after all interests concerned have been given a chance to be heard. It represents an immense amount of inquiry, and we believe that it is a conscientious effort to carry out the promise of the party in power to bring about a just revision of the tariff. Of course, it is not perfect. In fact, there is much about the new bill that can be unfavorably criticized, but it is not to be supposed that the first draft of so important a measure would be free from imperfections, and in the months which shall elapse before the final passage of the bill, from the conference committee, the measure will be vastly improved.

It is not our purpose at this time to discuss in detail schedule C relating to metals and manufactures thereof, but beginning at the very base of the iron business—iron ore—it seems to us that the house and senate will do well not to put ore on the free list, but to provide a moderate tariff, which would produce some of the revenue which is so badly needed by the government and at the same time afford reasonable protection for American ores. The representatives of the ore companies manifested a very fair disposition in the hearings before the ways and means committee, and it is difficult to understand why their offer to acquiesce in a reasonable reduction of the tariff was not accepted as was done in the case of others interested in the manufacture of iron and steel products. Free ore would undoubtedly benefit a few companies having large deposits in Cuba, which are now compelled to pay a duty of 32 cents, but it is doubtful whether in reasonably prosperous times other consumers would get any benefit of lower rates. In times of depression like the present, foreign interests would undoubtedly lower their ore prices, but the benefits resulting to American consumers would not be important.

Some explanation of the maximum rate provision of the new bill may be in order. The rates published in the bill are the minimum rates. It is then provided as to the metal schedule that the countries discriminating against the products of the United States shall be charged, on the articles covered by 31 paragraphs the rates of the Dingley tariff bill, and upon the 49 remaining paragraphs the proposed new tariff plus 20 per cent. It is provided that the maximum rates shall in no case go into effect earlier than 60 days after the passage of the act, and that the additional duties shall not apply to the cases where the preferential duties to other countries are those which are given by a province, dependency or colony to the mother country only. Under this provision, Canada would receive the low tariff rates in spite of the fact that special concessions are made to England. The proposed inauguration of a higher rate for those countries discriminating against the United States is a step in the right direction, as is also the provision making the wholesale price of articles in this country the basis on which to value imports consigned to this country and not offered for sale in the open market in the country of their origin. Owing to the new tariff bill now pending in France, levying maximum and minimum duties on machine tools and other American products, the importance of this nation having a similar law is manifest.

The bill contains a section which reads as follows:

That whenever a patent is issued by the United States to any citizen or subject of a foreign country, it shall be subject with respect to manufacture thereunder in this country to all the limitations, conditions, and restrictions that are imposed by the country of said citizen or subject upon the manufacture in that country under patents issued therein to citizens of the United States.

Concerning this feature, Chairman Payne said: "This will either compel foreigners obtaining patents in the United States to build factories and manufacture here for our trade or eventually forfeit the right to their patents." The provision is aimed directly at the British law which provides for the forfeiture of patents issued to citizens of other countries and which are put in process of manufacture within a certain period in Great Britain. It seems to be a most equitable plan and one which can hardly be classed as retaliatory, for it imposes no restrictions on citizens of foreign countries which do not first impose restrictions on Americans. Such restrictions as it may impose are exactly the same as those which the foreign country may impose on us. The passage of the British law brought forth a wave of protest from this side of the water, and justly so. Americans in large numbers held British patents, under which it was not feasible or profitable to manufacture in Great Britain or even in America at the time. The British patent being forfeited, any British manufacturer could take up the work, and in many cases compete with the American manufacturer, despite an adverse tariff duty. The proposed act will in a measure right the injustice.

INDUSTRIAL FREEDOM ON THE PACIFIC COAST

Notable Metal Trades Association Meetings at Portland, Seattle, and Spokane — Addresses by President Copeland and Prominent Manufacturers of the Northwest.

Spokane, Wash., March 18.—The three open shop meetings held in Portland, Ore., Seattle and Spokane, Wash., March 13, 15 and 17 under the auspices of the United Metal Trades Association of the Pacific coast, mark the beginning of a new order of things in the industrial affairs of the Pacific northwest. The keynote of the discussion at these meetings was that not only in one or two industries but in all industries the north coast is rapidly becoming free from the dictates of trades unionism. From being notorious as one of the most flagrant examples of the evil effects of union domination, the Pacific coast, with the single unfortunate exception of San Francisco, is now practically all an open shop territory from the Mexican line to the Canadian border.

Each meeting was largely attended and the personnel of each gathering was thoroughly representative. Not only were the members of the metal trades association present, but these were reinforced by many delegates from the various employing interests of the northwest. Representatives of nearly every line of industry employing labor, including the large public service corporations and lumber interests were in attendance. The Seattle meeting was the first recorded instance of a meeting of the employing interests for a common purpose.

The guest of honor and chief speaker at each meeting was Mr. F. K. Copeland of Chicago, president of the National Metal Trades Association and of the Sullivan Machinery Co., manufacturer of mining and quarrying machinery. In the three meetings, the broad features of the relations between labor and the employer, the practical operation of the trade union, the theory of the open shop principle and its practical application and the work of the employers' association in preserving industrial peace and just labor conditions were thoroughly and very ably expounded by Mr. Copeland. The necessity for well organized and effective co-operation between employers for the purpose of resisting the unreasonable demands of organized labor was the chief point that Mr. Copeland impressed upon his northwestern listeners.

The Portland Meeting.

The meeting at Portland, Ore., was held the evening of March 13 at the Portland Commercial Club. About 90 were present. The chairman of the evening was Wm. H. Corbett, president of the Oregon district of the United Metal Trades Association and president of the Willamette Iron and Steel Works, Portland. Mr. Copeland was the only speaker.

Mr. Copeland outlined the history of and results achieved by the National Metal Trades Association. He pointed out that the open shop is not inconsistent with good labor conditions, fair wages and a square deal. The application of a minimum wage as insisted upon by organized labor was denounced by the speaker. He declared that the minimum wage was false and unjust in principle and that it forced the competent workmen to carry along the unskillful and incompetent laborer. Mr. Copeland occupied considerable time in answering questions regarding open shop conditions that were put to him freely by those present.

Previous to the meeting, Mr. Copeland was entertained at an informal dinner at the Commercial Club at which covers were laid for 11, those present being the executive officials of the various commercial and industrial associations of the city.

The Seattle Meeting.

The Seattle meeting at which 80 were present was in the form of a dinner served at the New Washington hotel, Monday evening, March 13. The chairman of the evening was Senator J. M. Frink, president of the Washington Iron Works, Seattle.

In his introductory remarks, Mr. Frink spoke feelingly of the struggles the foundries and machine shops of the Pacific northwest have had with organized labor. He pointed out that the strike of the iron molders' union in the northwest had been officially called off only a month ago and only since that time have all parties concerned recognized the open shop as a permanent institution on the north Pacific coast.

In his Seattle address, Mr. Copeland outlined the early history of the National Metal Trades Association. He showed how the policy of organized labor to not only force unionism but to force many undesirable features of unionism onto every shop in the country compelled the manufacturers to give up their old theory that each concern could deal with its own labor problems and to organize for mutual defence. He said that at first the association had tried the expedient of making agreements with the unions, but that this failed because of the faithlessness of the union leaders. The present policy of the association to not treat with organized labor as such under any consideration was therefore adopted. Mr. Copeland dwelt at length on the necessity for continual, dependable co-operation between employers. He pointed out that it was just as essential for a manufacturer to break a strike and establish an open shop in his neighbor's plant 100 miles away as it was to have an open shop in his own plant, because the same organization is opposed to the open shop everywhere and a victory for this organization in one locality strengthens it in every other locality. The fight for the open shop is one fight against a common opponent and is one in which all manufacturers in every section of the country can co-operate.

The speaker also said that the open shop stands for the best sort of labor conditions, for broad welfare work and that the open shop employer must feel the responsibility of his position and treat his men better than they were ever treated under closed shop conditions.

Mr. Copeland summed up his remarks in the following concise statements:

1. Avoid a strike, if possible, and never go into one unless you are sure you are in the right.

2. Once entered into a strike, carry it through to a finish. If you cannot finish it, do not go into it.

3. Be sure your foremen are loyal and are not union sympathizers.

4. Stand by and protect your non-union men who come to help you out. Never take back the men who went out on the strike. Under all circumstances, *keep* your non-union men as long as you have any work for them to do and as long as they serve you faithfully.

"The employer who turns out his non-union men as soon as a strike is won and takes back the old men who deserted him in a time of need is following the most narrow minded policy that could be adopted, a policy that is both unfair and cowardly", said Mr. Copeland in conclusion.

Mr. Copeland's remarks were warmly seconded by a number of local manufacturers including T. B. Sum-

ner, Oliver Erickson, John Hartman and others.

The Spokane Meeting.

The meeting at Spokane was held at the Spokane Club, Wednesday evening, March 17. The attendance was good and was made distinctive by the presence of a number of Washington's most prominent citizens and employers. Previous to the address of the evening, a dinner was served to the Spokane members of the United Metal Trades Association and their invited guests. Those present at the dinner were: J. M. Fitzpatrick, Union Iron Works; F. K. Copeland, Chicago; C. L. Wilson, Washington Water Power Co.; Melancthon Walters, Spokane Harvester Co.; Chas. W. Colby, United Iron Works; W. S. McCalley, Spokane Harvester Co.; H. S. Hastings, United Metal Trades Association, Seattle; A. Y. Coy, Sullivan Machinery Co.; J. D. Morris, Spokane Harvester Co.; H. L. Bleecker, Washington Water Power Co.; E. T. Coman, Exchange National Bank; F. E. Goodall, Spokane Chamber of Commerce; and H. Cole Estep, THE IRON TRADE REVIEW.

In the absence of J. H. Boyd, president of the National Iron Works, who was ill, J. M. Fitzpatrick, manager of the Union Iron Works, Spokane, was chairman of the meeting.

Mr. Copeland covered much of the same ground in his Spokane address that he had at the two previous gatherings at Portland and Seattle. He called particular attention to the responsibility of employers for the labor conditions in the open shop. The open shop employer has taken from the union and shouldered upon himself the responsibility for the welfare of his employes. He said that wages were higher and conditions better in the open shop than in the closed shop and advised the employers to keep labor conditions so good that the labor organizers would have no opportunity to get a foothold. He pointed out that an employers' association should go beyond the mere maintenance of open shop conditions, should take a hand in legislation affecting labor and capital and should interest itself in the education of the employes. This welfare work is the most permanently beneficial that the association can do; the establishment and maintenance of trade schools and technical courses are of paramount importance.

Following Mr. Copeland, several prominent Spokane employers and financiers gave short addresses of interest. Those who spoke were F. E. Goodall, Edwin T. Coman, Chas. W. Colby, Melancthon Walters and H. L. Bleecker. The meeting was concluded with an informal discussion of the topic of the evening.

These three meetings will undoubtedly bear fruit in the formation of a strong co-operative association of all the employers of the Pacific northwest. The time is ripe for such a move. The Pacific coast has reached the turning of the ways in labor affairs. Open shop conditions have been generally obtained; the future will see either an intelligent continuance of effort to preserve these conditions or a relapse into the old state of affairs. Mr. Copeland's final plea was for organization and constant activity on the part of the employers, "for the labor agitator is ever busy."

MEN MOSTLY AGREE

To Wage Reduction Throughout Eastern Pennsylvania.

Harrisburg, Pa., March 23.—Wage reductions are just now occupying the attention of most of the employers and employes of the mills and furnaces in Eastern Pennsylvania. So far only three or four of the larger plants have failed to reach agreements with their men.

The Pennsylvania Steel Co., one of the largest of the employers in the central part of the state, made a 10 per cent wage reduction and its men have loyally responded to the request the company made of them to assist in carrying out business until trade conditions adjust themselves.

At Reading and in this city the puddlers objected to the reductions and mills were made idle. At other places the operatives went ahead at the reduced wages.

Central Foundry Report.—The annual report of the Central Foundry Co. for the 18 months ending Dec. 31 last, shows a deficit of $6,251. The statement of the president, August Heckscher, shows that the net income, after deducting operating expenses, was $474,678; maintenance of plants, etc., $133,259; interest paid, $347,670; total interest and maintenance, $480,929, leaving the deficit above noted. The net earnings of the Central Iron & Coal Co., and the Central Radiator Co., the capital of both of which is owned by the Central Foundry Co., were $115,541.

The Carnegie Steel Co. has put out the fires in the five open-hearth furnaces which had been started at the South Sharon works when the accident to the blooming mill engine prevented the resumitpon of that plant last week. It is expected that it will be at least two weeks before the engine can be repaired and the furnaces fired again.

METAL TRADES SUPERINTENDENTS' AND FOREMEN'S ANNUAL MEETING.

The first annual meeting and smoker of the Metal Trades Superintendents' and Foremen's Club of Cleveland, was held March 20. Almost the entire club membership was present. Reports of officers and committees were received, and new officers for the ensuing year were elected as follows: President, F. H. Francis, superintendent of the Kilby Mfg. Co; vice president, J. H. White, superintendent the Baker Motor Vehicle Co.; treasurer, F. W. Sebelin, foreman of the Cleveland Twist Drill Co., and secretary, Phillip Frankel, 310 New England building. An executive board was elected, consisting of the president, vice president, and treasurer, together with L. W. Bosley, foreman the Cleveland Hardware Co.; John N. Mortimer, superintendent the Central Brass Mfg. Co.; B. S. Blossom, superintendent of the Foote-Burt Co.; Benjamin D. Fuller, superintendent the Westinghouse Electric & Mfg. Co.; and George A. Weisman, superintendent of the Johnson & Jennings Co. Membership committee: J. H. Dove, superintendent C. O. Bartlett & Snow Co.; D. L. Lorimer, superintendent the Cleveland Punch & Shear Works Co.; Julius Watt, superintendent of the pattern department the Cleveland Punch & Shear Works Co.; J. L. Burrows, superintendent the American Railway Signal Co.; and Timothy Kollackey, superintendent of the Oster Mfg. Co. After the regular business meeting, lunch and cigars were served.

Since its inception, nine months ago, the club has grown until now its membership includes about 200 of the most prominent superintendents and foremen of the metal trades manufacturing plants of Cleveland. At all times, the club is desirous of having addresses delivered before it by men engaged in metal trades lines, on various subjects that may be of interest to its membership. Thus a good opportunity is presented to machine tool builders, steel manufacturers, and manufacturers in kindred lines to have their various demonstrators and salesmen talk to the members of the club on subjects of interest, and also present demonstrations. Meetings will be held on the third Saturday of every month. Further information will be gladly furnished by the secretary.

Ed. E. Squier Co., Bank of Commerce building, St. Louis, foundry sand, advises that it is in the market for about 2,000 feet of 16-pound rails complete with joints, switches, etc., as well as for six dump cars, with a capacity of about one yard. The company desires this for use in one of its large sand pits.

COKE CONSOLIDATION

By Independents Said to be Subject of Negotiations.

Negotiations have been opened by Pittsburg and eastern capitalists for the consolidation of independent coking operations in the upper and lower Connellsville regions into one large corporation. Progress has been made upon the project and some of the companies which have been approached are looking with favor upon the movement.

The optional agreements for the transfer of the various properties are being taken by John W. Boileau, Park building, Pittsburg, as the agent of the financial interests which are promoting the plan. The identity of the persons seeking thus to gain control of the independnet output, has not been disclosed. Mr. Boileau has been the personal representative of J. V. Thompson, a large independent coke operator and banker of Uniontown, Pa., who has dealt extensively in Greene county, Pa., coal lands during the past year.

At the present time, copies of agreements, and documents bearing statements of acreage, equipment, quality of product and other conditions which enter into the making up of the valuations of the various holdings, are being sought from the operators. In the general letter of instructions, the purpose of the consolidation is stated as follows:

To enter into an explanation of the conditions that have existed in the coking fields for nearly two years past would be the repetition of information known to every coke operator in the region, the price secured for the coke being far beneath what it should be, in some cases below actual cost. The advantages of a consolidation of the independent interests are many, and with one central organization, competition would be lessened and the business handled in an economic way. It means the regulation of prices and conditions so that even in times of depression, general demoralization, etc., where individual action is sometimes weak, good profits on the business secured could be maintained. It is self-evident that the business could be conducted on a broader and sounder economic basis.

The number of independent coke companies in the two regions at present are 60, controlling 72 plants equipped with a total of 12,000 ovens, and with a rated capacity of 10,000,000 tons annually. The coking coal acreage held is 18,000. If the consolidation is made, it will likely be capitalized at $60,000,000. The H. C. Frick properties of the United States Steel Corporation have an aggregate of about 20,000 ovens, independent iron and steel holdings are 3,000 ovens, and the Rainey estate operates about 3,000 ovens in the Connellsville regions.

After having been closed down a week, the Newport rolling mill and the Andrews steel plant at Newport, Ky., resumed operating March 15, with the prospect of at least two weeks run.

PERSONALS.

Milton E. Coombs has resigned as manager of the New Castle Forge & Bolt Co., New Castle, Pa.

W. H. Rust of Pittsburg has been appointed chief engineer at the wire department of the Youngstown works of the Youngstown Sheet & Tube Co.

Warren F. Perry, who was secretary of the Job Steel & Iron Co., Ashland, Ky., has returned to the employ of the Carnegie Steel Co. at the Ohio works, Youngstown, O.

President Powell E. Stackhouse, R. Francis Wood and Charles S. Price, directors of the Cambria Steel Co., whose terms had expired, were re-elected for three years at the recent annual meeting.

E. W. Pittman, formerly chief engineer of the Pittsburg Steel Construction Co., has been appointed contracting engineer, for McClintic-Marshall Construction Co., in charge of territory in the locality of St. Louis, effective March 1.

Charles Fell, who has been superintendent of the National Tube Co.'s tube and pipe mills at Lorain, O., has been appointed superintendent of the McKeesport, Pa., mills, succeeding A. M. Saunders, who will be employed at the company's general offices in Pittsburg.

Frank H. Nullmeyer, mechanical engineer and general manager of the Rankin, Pa., plant of the American Steel & Wire Co., has resigned to take service with the Youngstown Sheet & Tube Co. Frank Haines, of Joliet, Ill., has succeeded Mr. Nullmeyer at the Rankin plant.

John R. Back, who was superintendent of F. E. Reed Co., Worcester, Mass., and connected with the concern since its starting, in 1875, has severed his connection with the company. Mr. Back is now taking a much needed vacation. His plans for the future are not yet disclosed.

OBITUARIES.

Robert Tarrant, president of the Robert Tarrant Foundry Co., Chicago, died March 19, aged 77. He had been a resident of Chicago since 1856.

Mark T. Cox, banker, died March 23 at his home in East Orange, N. J. He was a director of the Harvey Steel Co. and heavily interested in the New Jersey Zinc Co.

William P. Henszey, member of the firm of Burnham, Williams & Co., proprietors of the Baldwin Locomotive Works, died March 23 at his Philadelphia home, aged 76. He had been connected with this concern for over 50 years, during which time 32,000 locomotives were built under his supervision.

William Henry Wahl, honorary secretary of the Franklin Institute, scientific journalist and metallurgist, died March 23 at Philadelphia, aged 60. He was once associated with the *Engineering and Mining Journal,* and for 15 years was editor of the *Manufacturer and Builder,* and wrote several technical works.

James Seville, one of the founders of the Reliance works, now the Allis-Chalmers Co., Milwaukee, died March 14 at Minneapolis. He was a pioneer resident of Milwaukee, removing there from Ohio in 1846, the next year establishing a factory for the manufacture of mill stones. Later a foundry was added to the plant which was one of the first to manufacture mill supplies in the country. Afterward, he removed to Duluth, where he established the National Iron Works, later taking up his residence at Minneapolis.

METAL TRADES NOMINATIONS.

Hon. C. P. Neil, United States commissioner of labor, has accepted the invitation to address the National Metal Trades Association convention at the Hotel Astor, New York, April 14-15, on the subject of "Industrial Peace".

The ballot of the nominating committee of the association contains the following names: President, Howard P. Eells, The Bucyrus Co., S. Milwaukee, Wis.; first vice president, J. H. Schwacke, Wm. Sellers & Co., Inc., Philadelphia; second vice president, H. W. Hoyt, Great Lakes Engineering Works, Detroit; treasurer, Wm. Lodge, The Lodge & Shipley Machine Tool Co., Cincinnati. Councillors for two years, R. D. Reed, the H. B. Smith Co., Westfield, Mass.; Henry Sharpe, Brown & Sharpe Mfg. Co., Providence; Edgar McDougal, Allis-Chalmers-Bullock Ltd., Montreal; F. C. Caldwell, H. W. Caldwell & Son Co., Chicago; L. H. Kittredge, the Peerless Motor Car Co., Cleveland; B. B. Quillen, The Cincinnati Planer Co., Cincinnati. Councillors for one year, Paul B. Kendig, Seneca Falls Mfg. Co., Seneca Falls, N. Y.; M. K. Bowman, Griscom-Spencer Co., New York City; Herbert Rice, The Waverley Co., Indianapolis. Councillors to serve unexpired terms, E. P. Robinson, The Atlantic Works, East Boston, Mass.; W. A. Layman, Wagner Electric Mfg. Co., St. Louis; Geo. Mesta, Mesta Machine Co., Pittsburg.

The Reading Iron Co. is re-constructing the Crumwold blast furnace plant at Emaus, Pa. A new furnace and a modern stock handling equipment will be built. Frank C. Roberts & Co., of Philadelphia, are the engineers.

AMONG MACHINERY MAKERS.

NEW YORK.

Some Improvement in Inquiry, But Sales are Few.

Office of THE IRON TRADE REVIEW, Room 1005, No. 90 West St., March 23.

The March machine tool trade has shown some improvement, but is good only by comparison with that of February, which was generally one of the dullest months since the beginning of the depression. Conditions are still far from normal, and actual sales are few and usually small, though there is a satisfactory volume of inquiry current. Builders of industrial cars and of power plant equipment, in particular, report numerous calls for quotations, but the amount of business being closed up is so small as to be out of all proportion.

The Youngstown Car Mfg. Co., through its New York office, 90 West street, has booked an order for ten all-steel double side dump mining cars for shipment to Costa Rica.

The Maxwell-Briscoe Motor Co., Tarrytown, N. Y., has sent to the trade and is receiving figures on a considerable list of scattered machine tools, the aggregate being in the neighborhood of $25,000.

Some extensive improvements are being made by the Buffalo Copper & Brass Co., Buffalo, N. Y., in connection with which it is understood that orders have already been placed for considerable rolling mill equipment.

Bids have been taken on additional equipment for the power plant of the Central State hospital, Central Islip, L. I., notably a 100-KVA alternator, direct connected to a 190-horsepower engine. Tenders are soon to be asked on similar improvements at Kings Park, L. I.

On petition of the Housatonic Water Co., of Derby, Conn., Judge W. S. Downs has been appointed receiver for the Williams Typewriter Co., of that city. Liabilities are placed at between $300,000 and $400,000.

The Baldwin Locomotive Works, Philadelphia, recently received an order for 25 locomotives from the Chicago, Burlington & Quincy.

The main building of the Easton Foundry & Machine Co., at Easton, Pa., was destroyed by fire March 18, with an estimated loss of about $150,000. The plant was running full time and with practically a full force.

The National Conduit & Cable Co., principal offices of which are at 41 Park Row, is understood to be preparing for the installation of a copper and brass wire drawing plant in connection with its works at Hastings, N. Y. This interest has recently been in the market for some large machine tools.

The sale of the Oaks plant of the defunct United States Brick Co., located near Norristown, Pa., has been postponed until April 8-9. The property cost about $1,000,000.

CINCINNATI.

Increase in Orders Encouraging, But Business Not Brisk.

Office of THE IRON TRADE REVIEW, First National Bank Bldg., March 23.

The general tone of the market is slightly better this week than last and while the business is still spotty and far from normal, the increase in orders has been quite encouraging. The effect of tariff revision upon this industry appears to be regarded as rather helpful than otherwise, providing in the final passage of the bill the law-makers have in view the preservation and development of our export machine tool business. The manufacturers in this center have had sufficient experience to understand that it is a business that cannot be forced under trying conditions and they also know that with returning general prosperity the demand for machine tools will again be sufficient to keep the plants running. It is simply a question of waiting and, although the waiting becomes tedious, it is encouraging to realize that nothing has occurred to disturb confidence in the return of business. While the tariff revision is held to be partially responsible for the halting condition of business, it is not believed that, with the settlement of the tariff question alone, we can return to a normal basis. An improvement is expected when the uncertainties now confronting the business world in regard to the tariff are disposed of, and it is the hope of manufacturers that congress will dispose of the matter as expeditiously as possible.

The Cincinnati Planer Co. has commenced work on its additional shop in the factory colony at Oakley. The shop now built is 140 x 200, and the company is adding 200 feet more, which will make the shop when completed 140 x 400 feet. The construction of an office building, of two stories with a drawing room on the second floor has also been started and the contracts are being let for the building of a stock room next to the shop, 20 x 60 feet.

The Tool Steel Motor Gear & Pinion Co. has changed its name by dropping the word Motor. The capital has been increased from $100,000 to $300,000. Edward E. Dwight, Leroy Brooks Jr., Edward L. Brooks, Louis W. Gatch and A. P. Gahr are new men in the company. The enlarged capitalization is to provide for an expansion of the business, about $20,000 worth of additional machinery is now being installed in the plant and it is intended later on to erect new buildings.

A party of 25 young men in charge of Prof. L. K. Frankel from the University of Kentucky, of Lexington, spent two days in Cincinnati, visiting machine tool plants. The young men were members of the junior class in mechanical engineering. They visited the plants of the American Tool Works Co., Cincinnati Bickford Co., The Cincinnati Milling Machine Co., The Cincinnati Planer Co., and the Cincinnati Gas & Electric Co. The party on leaving here went to Hamilton, O., and to Dayton, O., for a similar tour of inspection.

The council of Newport, Ky., passed an ordinance this week providing for $85,000 worth of water works bonds for the purpose of erecting a new pumping engine and constructing an extra main from the reservoir to the city.

The business in automatic spur gear cutting machines, heretofore conducted by The Cincinnati Shaper Co., has been transferred to The Cincinnati Gear Cutting Machine Co., Cincinnati, which company in the future will manufacture and sell this line of machine tools.

The Cincinnati Milling Machine Co. has enjoyed an exceptional run of orders recently and is now running full time and full force and is behind in deliveries for some sizes.

The Cincinnati Lathe & Tool Co. reports business steadily improving; and this far in the month of March business has been 60 per cent of normal with this company, indicating an increase of 15 per cent over the February record.

The Lodge & Shipley Machine Tool Co. reports the demand for lathes during March decidedly better than in February.

MILWAUKEE.

Additions to Plants Show Confidence in the Future.

Milwaukee, Wis., March 22.—The fact that so many machinery manufacturers in and about Milwaukee are erecting new plants or additions thereto is taken as an indication that plenty of confidence exists for business improvement. Orders are arriving more plentifully than a few weeks ago, another fact which warrants a general expansion.

The Bucyrus Co. of South Milwaukee, which has a large government contract for steam dredging machines for use in building the Panama canal, is erecting a steel addition to its foundry plant, 75 x 130 feet.

Plans have been completed by the Gerlinger Steel Casting Co. of West Allis for the erection of a 28 x 60 foot addition to its establishment in order that the market increase in business may be handled. Two large furnaces will be installed in the addition.

The Standard Ground Key Works of Milwaukee will erect a new foundry at Fond du Lac avenue and Thirty-first street at a cost of $6,000. New equipment will be installed and the capacity of the present plant will be increased. The company has been incorporated recently with a capital stock of $25,000 by Paul Jaeschke, Charles Kirchhahn and Alfred Jaeschke.

Plans have been completed for the erection of an addition to the Fred Hoehne machine shops at Kaukauna, Wis. The business has outgrown its present location.

The new building which is being erected by the Pressed Steel Tank Works at West Allis is nearly completed and the furnaces will be installed at once. The new structure will be used largely for the manufacture of the newly patented seamless steel barrel with which the company is meeting with much success.

The La Crosse Plow Co. at La Crosse, Wis., will soon begin the erection of a 80 x 300-foot building to be strictly fireproof and modern in every respect.

The new plant of the Badger Malleable & Mfg. Co. at South Milwaukee has been opened and employment is given to 150 men. Seven months were required for the erection of the building, which is the largest in the suburb.

The Cincinnati Iron & Steel Co. has opened a new department for handling pig iron and coke, and has placed it in charge of Robert Field, formerly of the Robert Field Co., well known in the pig iron business.

PRESSED RADIATOR CO. OF AMERICA.

The Pressed Radiator Co. of America has just been incorporated under the laws of Pennsylvania with an authorized capital of $1,250,000. This new corporation will absorb the Pressed Radiator Co., a New Jersey corporation, providing at the same time $500,000 additional capital. The additional capital is to provide the increased manufacturing facilities required by the rapidly expanding business in pressed radiators, and also to provide for the company's engaging in the manufacture of boilers and heating specialties.

It has been deemed expedient to change the corporate title, adding the words "of America," because of the extensive foreign business in pressed radiators which has developed in the last three years. Besides its own offices in Pittsburg, New York and Chicago, and 25 agencies in the principal cities of the United States, the Pressed Radiator Co. already has its own offices in London and Paris, and agencies in Hamburg, Brussels, St. Petersburg and Yokohama. Pressed radiators are made of galvanized sheet steel. The works and principal offices of the company are in Pittsburg.

The officers of the company are as follows: President, H. W. Armstrong; vice president, W. N. Murray; second vice president, A. M. Pearson; secretary and treasurer, R. R. Gordon.

The great English firms of Armstrong, Whitworth & Co., New Castle, and Vickers, Son & Maxim, of Barrow, are jointly engaged in the erection of large new steel works in Japan for gun forgings, which works will ultimately become the property of the Japanese government. They will be engaged in the erection of the plant under the direction of the Japanese admiralty, assisted by English experts. Mr. John Noble, of Armstrong, Whitworth & Co., who is returning to England, has secured an important order from the Japanese government for a large number of guns and gun-mountings.

In order to operate the Sam Lanham blast furnace and cast iron pipe industry of the state at Rusk, Tex., the governor of Texas has requested the legislature to appropriate $100,000, the money to be repaid to the state within 18 months.

DAMAGES ASSESSED

Against Canadian Labor Unions—Injunction Made Perpetual.

Toronto, Can., March 20.—Judgment has been given by Judge Mathers, at Winnipeg, in the case of the Vulcan Iron Works Co., of that city, against Winnipeg Lodge No. 122 and Fort Garry Lodge No. 189, of the International Association of Machinists and other trade union organizations. The case arose out of the strike or lockout of 1906, the company suing the unions for damages for loss sustained and asking for a perpetual injunction against picketing its premises. The decision is in favor of the plaintiffs, making the temporary injunction as to picketing perpetual, and awarding $500 damages against the unions and several individual defendants named in the proceedings. The judgment is regarded as of great importance, as limiting the power of trades unions during strikes and labor troubles, and is in harmony with a similar decision rendered a few days before by the Manitoba appeal court, in which heavy damages were awarded against the plumbers' union for losses occasioned by picketing. It is probable that both cases will be carried to the British Privy Council for final adjudication.

The Page-Hershey Co., manufacturer of water and gas pipes, which is establishing a branch at Welland, Ont., has let contracts to the Berlin Construction Co., of Berlin, Conn., for the erection of large mills for which ground will be broken about April 1. The company will also erect a large number of houses for its employes who will number several hundred.

James D. Bain, senior member of the firm of James Bain & Son, machinists, of Hamilton, Ont., died March 15, aged 72, after a protracted illness. He was born in Edinburgh, Scotland, and came to Hamilton in 1871. His son, Thomas Bain, is superintendent of the Kilby Mfg. Co., Cleveland.

The Belden Sheaf & Hay Loader Co., Ltd., of Palmerston, Ont., has been incorporated to manufacture harvesting machines, with an authorized capital of $50,000; by Wm. L. Holmes, George Howe, Philip Ament and others.

The Standard Combination Motor Rim Co., Ltd., has obtained a charter with a capital of $100,000, to manufacture automobiles, etc., at Toronto.

SOME COMMENTS ON THE PAYNE TARIFF BILL

FOREIGN TRADE

Necessary for Machine Tool Manufacturers—Satisfied With New Plan.

Office of THE IRON TRADE REVIEW,
First National Bank Bldg.,
Cincinnati, March 23.

The proposed reduction in the tariff on machine tools is practically in line with the brief filed with the ways and means committee by the foreign trade committee of the National Machine Tool Builders' Association, which brief was afterward endorsed by approximately 95 per cent of the American manufacturers of machine tools. The brief read as follows:

We, the undersigned representatives of the machine tool industry of the United States, voicing what we believe to be the opinion of machine tool manufacturers generally, respectfully petition your committee that in the contemplated revision of the tariff, full consideration be given to the protection of our foreign trade.

Inasmuch as an average of 30 per cent of our output is sold to foreign countries, some of which have been continuously raising their tariff against us—and today threaten such further advance as will be practically prohibitive (as for instance, in the proposed French tariff advance)—therefore we desire to place ourselves on record as favoring a reduction in the present domestic tariff on our product, machine tools, wherever such reduction will secure for us a corresponding consideration in the tariffs levied against American machine tools by foreign countries.

And to this end we request that the present tariff of 45 per cent be maintained only as a maximum tariff, and that a minimum tariff of 30 per cent be established, with which we may favor such foreign countries—as in return may favor us in their tariff schedules.

The American machine tool builders are not much concerned about foreign machine tool builders invading this country, but they are deeply concerned in the tariff schedules of other countries and to this end they have asked for a reduction in the tariff on imports in order that our government would be in position to point out that this country is not maintaining an excessive tariff against foreign countries on this product and could consistently ask for reduction in such schedules as proved to be prohibitive to us.

It is believed that, even if machine tools were admitted free, only a few cheap and inferior types of foreign machines could be brought to this country from abroad. The high efficiency of our machines, it is asserted, will protect our home markets. The most important feature, therefore, in tariff revision on machine tools is to secure for this country as liberal treatment from foreigners as it is possible to obtain. Our foreign trade in machine tools is of great importance to us. It is essential that we hold and develop this trade in order to continue to specialize in our manufacture. Without a world market for our machines, our shops would, it is believed, be forced to follow a more general line of manufacturing and instead of one large plant making exclusively lathes and developing them to their highest efficiency, and another milling machines and specializing on them, these shops would be forced to make a general line and compete in the home market for what trade there was. It was the necessity of keeping the door open to this country which brought about the action taken by the National Machine Tool Builders' Association and which governed the large number of machine tool builders in this country in endorsing this action. The sentiment therefore of the machine tool trade of this country seems to favor such changes in the tariff as will be calculated to give us the most advantageous terms with other countries, relying upon the superiority of our product to protect us against the foreign machinists.

FREE IRON ORE

Not Popular Among Cleveland Ore Men—The Pig Iron Duty.

In Cleveland the matter of paramount interest concerning the new tariff bill is the provision for free ore. The Lake Superior iron ore interests are willing to take a moderate reduction, but do not consider that it is fair to put ore on the free list. The representative of one leading ore interest said: "When in 1894 the Democrats proposed to put ore on the free list in the Wilson bill, there was a mighty protest, but now we are in the hands of our friends, and it doesn't hurt to have one's throat cut by his friends." Another man who has long been identified with Lake Superior iron ore interests said: "The provision for free ore shows the influence of Mr. Carnegie with the committee. Mr. Carnegie has invested a number of million dollars in the Bethlehem Steel Co., which owns large Cuban ore deposits, and naturally desires free ore. In times of depression like the present, the price of foreign ore will be reduced and the manufacturers of iron and steel will get the benefit, but in prosperous titmes they will not be benefited. It is strange that the government, when it needs revenue so badly, should put ore on the free list." A prominent member of the Lake Superior Iron Ore Association expressed the opinion that it would be useless to do anything while the Payne bill is pending in the house, but that it would be wise to wait until the bill goes to the senate, and then make a determined effort to have a moderate tariff placed on ore.

As to the reduction in pig iron from $4 to $2.50, the general opinion of blast furnace men is that $3 would have been a fairer rate.

SOUTHERN FURNACES

Would Suffer From Competition With Foreign Makers.

In speaking of the proposed reduction in the tariff on pig iron, James A. Green, of Matthew Addy & Co., Cincinnati, said:

"The present price of English iron is low as is the price here. As a matter of fact we boast a great deal of our great natural advantages, but the English in particular have natural advantages the same as we have.

"The proposed tariff will operate to give our tidewater iron markets to the foreign furnaces. Take this table, which represents the prices today of Birmingham, Ala., and the English iron, No. 3 foundry grade, laid down at Atlantic ports. On the English iron the base price is figured at 47 shillings and 3 pence per ton—the cabled quotations—and to this add the new duty of $2.50 and $2 for ocean freights, etc. As iron has often been brought over for $1.50 per ton the figuring is on the safe side. It is well to also remember that American prices are lower today than they have been for five years.

	Alabama iron.	Va. iron.	English iron.
F. o. b., Philadelphia..	$15.00	$17.30	$15 84
F. o. b., Baltimore....	14.85	16.90	15.84
F. o. b., New York....	15.25	17.80	15 84
F. o. b., Boston.....	15.60	17.70	15.84

"As the ocean freight can be shrunk at least 50 cents per ton it is easy to see that when the new tariff goes into effect, if it is passed, there will be immediate danger of the loss of at least the New England markets. The worst of it is, too, that at the prices ruling today for American iron there is no profit whatever to the

maker, but a direct loss. If we have to accommodate ourselves to a change in the tariff the only way to do it will be to reduce wages. That is the beginning and end of the whole matter."

MANY OBJECTIONS

To Provisions for Finished Materials—Changes in Bill Expected.

Office of THE IRON TRADE REVIEW, 510 Park Bldg., March 23.

While some heavy reductions from the present protective tariff schedules had been anticipated by Pittsburg iron and steel makers, the terms of the Payne bill, as introduced in congress, have generally brought considerable disappointment in confirming their worst expectations. The introduction of the bill is viewed with relief, nevertheless, as setting at rest the speculation over its contents and as fixing the point from which the manufacturers may work to clear the market of this present disquieting factor.

The Pittsburg industrial district, having always been a stronghold for high protection, looks with much misgiving upon the practically 50 per cent reduction in finished products. Some striking inconsistencies in the Payne bill are pointed out, and strong efforts will be exerted before the senate to revise these unsatisfactory clauses. Much dissatisfaction is found with the action of the ways and means committee in including steel bars, steel saw plates and other finished materials in the same category with steel ingots, blooms, slabs and billets, all crude or semi-finished material. No consideration is paid here by the tariff framers to the conversion charge of bars over billets, which is declared to be almost entirely a question of labor. Bar iron is put in a classification by itself and is protected $8 per net ton, while steel bars, ranking with crude and semi-finished materials, have a duty of only $3.50 a net ton, when the foreign product is selling at 1c a point or less. At the present time, it is said foreign steel bars are being offered at seaboard less duty at 95c per 100. The present duty on billets is $4.72 and under the new tariff it will be $3.92 per gross ton. The placing of plates under a 20 per cent ad valorem duty does not meet the approval of makers, because it is the only important product of the iron and steel group to be so regulated, all the others having specific duties.

The reduction of the duty on shapes from $10 to $6, it is declared, gives the German, British, Belgian and other foreign makers an additional advantage in competing with domestic manufacturers for Pacific coast business. It is said the foreign companies were already able to undersell American mills for this trade, although they have had the disadvantage, which still remains, of being unable to guarantee deliveries because of irregular ocean freightage.

Ore interests in this district do not regard with apprehension the removal of the duty. It is recognized that eastern furnace companies which have been drawing their supplies from Cuba, Spain and other countries, will be benefited considerably, but it is not believed that this will cause serious competition with the Superior ranges. As to the known Canadian deposits, it is pointed out that some of the largest consumers in the Dominion are now getting their ore from the Mesabi or Old Range deposits.

The reduction of the pig iron duty from $4 to $2.50 is not expected to have much effect upon this district except that it may act as a preventive of runaway conditions in the domestic pig iron market and render impossible some of the extravagant prices which have ruled in the past. It is stated that under the depressed conditions and low prices in England now prevailing, Cleveland iron matching high grade domestic No. 2 foundry cannot touch the eastern seaboard duty paid at much less than $16, a figure which local American makers are now easily meeting.

The placing of ferro-silicon on a 15 per cent ad valorem basis compared with a former fixed duty of $4 a ton, has raised much objection, as it is stated it will impose much hardship upon the domestic industry. Attention is directed to the present market, where, with even a $4 duty, the foreign product is underselling the domestic and has temporarily at least driven American makers out of business. On the basis of today's market on foreign 10 per cent, the duty under the new tariff would be about $2.50 a ton, thus giving the European makers additional advantage. In ferro-manganese it is contended that a fixed duty would have been much more equitable than an ad valorem rating, since this product has been subject to considerable fluctuation in times past which would tend to make either buyer or seller reluctant to assume duty charges figured ad valorem.

Tin plate makers are well satisfied with the drafted bill since the 1 2-10c per pound duty provided coincides with the ideas of the representatives of this industry who gave testimony before the ways and means committee. Some objection is made, however, to the reduction on light sheets, as it is stated the market does not justify this cut.

Generally, Pittsburg manufacturers take the view that the Payne bill as now drafted appears in its worst form for them, and that further legislative attention given it will be in the direction of a more satisfactory final enactment.

FAVORABLE COMMENT

In Eastern Pennsylvania Owing to Free Ore Provision.

Harrisburg, March 23.—The new tariff bill, with its provision for free ore and reduced rates on iron, is being rather favorably received among the iron and steel men of Eastern Pennsylvania outside of the Pennsylvania and Bethlehem interests, which are openly for it because of the advantage which it gives them with their extensive holdings of Cuban ore.

The bill has been commended by men interested in those two big companies, but some of the others who are interested in lake ore or control large beds of local ores, are a little slow in coming forward. They are counting up whether it will be cheaper for them to buy their ore from abroad or to develop their holdings.

The Pennsylvania company, which controls the Maryland, will be in a very advantageous position because of the location of the Sparrows Point works at tidewater and connections it has at Chester. The Steelton works are only about 100 miles from the seaboard, so that the five Dauphin county furnaces are not so far away either. The company's two Lebanon furnaces have the Cornwall supply at their sides.

The Central company is interested in some Superior properties and no expression has been made by its officials yet. Other independent concerns are now weighing the matter and inclined to favor the new bill provided they can be assured of good freight rates.

AMERICAN BUSINESS

And Tariff Revision Discussed by English Manufacturers.

A Sheffield firm's American business in steel was the principal feature of interest at the annual meeting of William Jessop & Sons, Ltd., held at Culver's hall, Sheffield, on March 12. A. J. Hobson presided, and said the firm had had to issue new capital because of the American financial crisis, wihch made it difficult for more than three months to get remittances from the United States, but the concern was now in a strong position. The excessive stocks in

America had been reduced, but the profit of last year was the lowest for many years. As a steel concern, it was more heavily interested than any other firm in the American market, which had been the worst in the world during the last 12 months. The firm had not been able to make up in other markets for the heavy shrinkage in the American trade. It was most satisfactory that it was able to pay a 5 per cent dividend. There were signs of improvement, as during the month of February the firm sent nearly twice as much to America as in the corresponding month of last year, and the order sheets from that country were more healthy. One of the things which held trade back was the suggested new tariff. From whatever point of view, interference with the tariffs was always a source of great anxiety, and all would be relieved if it was got out of the way as quickly as possible. With regard to high-speed steel, the firm did not feel in any way alarmed that it should not be able to produce tool-steel equal to that of any other firm, or that the steel would not command its usual place in the tool-steel market of the world. There was nothing in the new development to cause them anxiety.

Colonel Hughes, in seconding, said that the whole world had been a storm, the center of which was the United States.

The chairman, replying to various shareholders who wished to know whether the American works had been a success, said the year had been a most unfavorable one in America, their output for the year being only 23 per cent of their full capacity. They only showed a small manufacturing profit, not sufficient to cover the expenses of the year. Next year's results would probably be satisfactory. The chairman emphasized the fact that the works were not established in America to make Sheffield specialties, but to produce work largely which did not come to the city. If they had not been willing to produce those goods they would have lost the trade. They would regret if tariff matters compelled them to transfer the works from Sheffield to America, as they preferred to keep the operations in Sheffield under their own eyes.

Hannah furnace of the Republic Iron & Steel Co. at Youngstown, was banked March 9. The company has in blast in the north only two stacks at Hazelton.

METAL SCHEDULE OF THE PAYNE TARIFF BILL.

The following are the provisions of the metal schedule of the new tariff bill:

Ore, Pig Iron and Scrap.

"Iron ore and basic slag, from 40 cents per ton to the free list.

"Pig iron, iron kentledge and spiegeleisen, from $4 to $2.50.

"Scrap iron and steel, from $4 per ton to 50 cents per ton.

"Bar iron from 6/10 of 1 cent to 4/10 of 1 cent per pound.

"Round iron, less than 7/16 of 1 inch in diameter, from 8/10 of 1 cent to 6/10 of 1 cent per pound.

"Slabs, blooms, loops or other forms less finished than bars, from 5/10 of 1 cent to 4/10 of 1 cent per pound.

"Charcoal iron, from $12 to $6 per ton.

"Beams, girders, joists, angles and so forth, from 5/10 of 1 cent to 3/10 of 1 cent per pound.

"Anchors, from 1½ cents per pound to 1 cent.

"Iron and steel forgings, from 35 per centum to 30 per centum, ad valorem."

Hoops and Bands.

"Hoop, band, or scroll iron or steel, not thinner than No. 10 wire gage, from 5/10 of 1 cent to 3/10 of 1 cent per pound; thinner than No. 10 and not thinner than No. 20, from 6/10 of 1 cent to 4/10 of 1 cent per pound; thinner than No. 20, from 8/10 to 6/10 of 1 cent per pound. Steel bands or strips, untempered, suitable for making band saws, from 3 cents per pound to 1½ cents; if tempered, from 6 cents per pound and 20 per centum ad valorem to 3 cents per pound and 20 per centum ad valorem.

"Cotton ties from 5/10 of 1 cent per pound to 3/10."

Rails and Sheets.

"Railway bars and steel rails, from 7/20 of 1 cent per pound to 7/40; railway fish plates, from 4/10 of 1 cent per pound to 2/10.

"Iron or steel sheets, valued at 3 cents per pound or less, thinner than No. 10 and not thinner than No. 20 wire gage, from 7/10 to 5/10 of 1 cent per pound; not thinner than No. 25, from 8/10 to 6/10 of 1 cent; not thinner than No. 32, from 1 1/10 cents to 8/10 of a cent; thinner than No. 32, from 1 2/10 cents to 9/10 of a cent; corrugated or crimped, from 1 1/10 cents to 8/10 of 1 cent per pound.

"Sheets, polished, planished or glanced, from 2 cents to 1¾ cents per pound; if pickled or cleaned, 2/10 of 1 per cent per pound in addition.

"Tin plates, from 1½ cents to 1 2/10 cents per pound."

Steel Wire and Bars.

"Round iron or steel wire, not smaller than No. 13 wire gage, from 1¼ cents per pound to 1 cent; not smaller than No. 16, from 1½ cents to 1¼ cents per pound; smaller than No. 16, from 2 cents to 1½ cents per pound.

"That all the foregoing valued at more than 4 cents per pound shall pay not less than 40 per centum ad valorem.

"Steel bars or rods, cold rolled, cold drawn or cold hammered, or polished, from ¼ of 1 cent per pound in addition to above rates, to ⅜ of 1 cent per pound; on strips, plates or sheets of iron or steel, other than polished, where cold rolled, and so forth, from 1 cent per pound, in addition to the rates on plates, to 5/10 of 1 cent per pound.

"Bolts, with or without threads or nuts, from 1½ cents to 1¼ cents per pound."

Pipe, Chains, Tubes.

"Cast iron pipe, from 4/10 of 1 cent to ¼ of 1 cent per pound.

"Cast hollow ware, coated, glazed or tinned, from 2 cents to 1½ cents per pound.

"Chains not less than ¾ of an inch in diameter, from 1⅛ cents to ⅞ of a cent per pound; not less than ⅜ of an inch in diameter, from 1⅜ cents to 1⅛ cents; not less than 5/16, from 1⅞ to 1 6/8 of 1 cent. But no chains will pay less than 45 per centum ad valorem.

"Lap welded, butt welded, seamed or jointed iron or steel boiler tubes, if not less than ⅜ of an inch in diameter, from 2 cents to 1 cent per pound; not less than ¼, from 2 cents to 1½ cents per pound; if less than ¼, 2 cents per pound; welded cylindrical furnaces, from 2½ cents per pound to 2 cents per pound; all other iron or steel tubes, from 35 per centum to 30 per centum ad valorem.

"Table, butchering, carving, etc., knives, with pearl, shell or ivory handles, from 16 cents each to 14 cents each; handles of deer horn, from 12 cents each to 10 cents each; with handles of hard rubber, bone, celluloid, and so forth, from 5 cents to 4 cents each; with other handles, from 1½ cents each to 1 cent each, with the same ad valorem addition of 15 per centum, provided that none of the above shall pay at a less rate than 40 per centum ad valorem, instead of 45 in the present law.

"Files were reduced from specific rates, the equivalent of 80 per centum ad valorem, to 40 per centum ad valorem."

Nails, Tacks, Saws.

"Cut nails, spikes, from 6/10 of 1 cent to 5/10 of 1 cent per pound.

"Horseshoe nails and hob nails, from 2¼ cents to 1½ cents per pound.

"Wire nails, not lighter than No. 16 wire gage, from ½ of 1 cent to ¼ of 1 cent per pound; lighter than No. 16, from 1 cent to ½ of 1 cent per pound.

"Spikes, nuts, washers and horse, mule or ox shoes, from 1 cent to ½ of 1 cent per pound.

"Cut tacks, not exceeding 16 ounces to the thousand, from 1¼ cents to ⅝ of 1 cent per 1,000; exceeding 16 ounces, from 1½ cents to ¾ of 1 cent per pound.

"Steel plates, engraved and so forth, from 25 per centum to 20 per centum ad valorem.

"Rivets, from 2 cents to 1¼ cents per pound.

"Cross cut saws, from 6 cents to 5 cents per foot; mill saws, from 10 cents per linear foot to 8 cents per linear foot; pit and drag saws, from 8 cents per linear foot to 6 cents per linear foot; circular saws, from 25 per centum ad valorem to 20 per centum ad valorem; steel band saws, from 10 cents per pound to 5 cents per pound, and 20 per centum ad valorem remaining; all other saws, reduced from 30 per centum to 25 per centum ad valorem.

"Screws, more than 2 inches in length, from 4 to 2½ cents per pound; over 1 inch and not more than 2 inches, from 6 cents to 4 cents per pound; over ½ inch and not over 1 inch, from 8½ cents to 6 cents per pound; ½ inch and less, from 12 cents to 8 cents per pound.

"Wheels for railway purposes, or parts thereof, from 1½ cents to 1¼ cents per pound; ingots, blooms, or blanks for the same, from 1¼ cents to 1 cent per pound."

Aluminum, Zinc, Lead.

"Aluminum, in crude form, from 8 cents to 7 cents per pound; in plates, from 13 cents to 11 cents per pound.

"Hooks and eyes, from 5½ cents to 4 cents per pound, retaining the additional 15 per centum ad valorem.

"Lead bearing ore, on the lead contents therein, from 1½ cents to 1 cent per pound.

"Lead dross bullion, base bullion, and lead in pigs, from 2⅛ cents to 1½ cents per pound; in sheets, pipes, shot, from 2½ cents to 1⅞ cents per pound.

"Zinc in blocks or pigs, from 1½ cents to 1 cent per pound; in sheets, from 2 cents to 1¼ cents per pound.

Machinery.

"Cash registers, electrical apparatus and machinery, jute manufacturing machinery, linotype and all type setting machines, machine tools, printing presses, sewing machines, typewriters, and all steam engines, from 45 per centum to 30 per centum ad valorem. Embroidery machines and lace making machines, the same rate, with the proviso that they may be imported free until July 1, 1911.

"Steel ingots cogged ingots, blooms and slabs, valued at 1 cent per pound or less, from 3/10 cent per pound to 7/40; and on the other valuations the reductions are 1/10 cent per pound with the exception of those valued above 7 cents and not above 10 cents, upon which the duty remains the same; and upon those valued above 30 cents per pound upon which the duty is made 15 per centum ad valorem."

LAKE SUPERIOR MINING NOTES.

Joseph Sellwood, of Duluth, is opening two new mines this year. The Pearson mine is an underground property near Nashwauk, and the shaft is now being sunk. The equipment formerly at the Holland mine, near Biwabik, now worked out, was purchased and is being used at the Pearson. The other property is known as the Perkins and is located near the Steel Corporation's Stephens mine, on the eastern end of the range. This ore body will be stripped and the contract has been let to McCarthy Bros., who are now at work.

A. B. Coates, of Virginia, who has acquired entire control of sections 10-58-19, is sinking a shaft in that property and is down a little over 100 feet. The ore body is of very moderate size and contains a standard Mesabi non-Bessemer ore. It is unlikely that shipments will be made from this mine during the present season.

The Euclid Mining Co., which is opening a property on the shore of Longyear lake, at Chisholm, will be prepared to ship in the neighborhood of 50,000 tons this year. The ore here is a non-Bessemer of excellent physical structure and high in iron. The ore body is being stripped immediately adjacent to the lake and the stripping is being used in part to fill in and back the water away from the ore body which extends under the former confines of the lake. A shaft will be put down into the pit and the ore hoisted out. A part of the mining will have to be done underground. An interesting test case will probably develop between the state and the Euclid Mining Co., as the result of this operation. The law formerly held that, should the water in a meandered lake disappear, the property owners along the shore line were entitled to a proportionate division of the new ground. Under a new law just passed, the state lays claim to ownership of this land formerly lake bottom and also to the mineral rights thereof. The working of the ore body already proven up will carry the mining over into the disputed ground and will offer opportunity for settling a dispute which is probably applicable to other lakes in mineral districts. The mining company in the present case is protected by its lease in the matter of its minimums, should mining be suspended pending a decision in the matter. The same interests are drilling a small ore body on the town site of Virginia. The entire ore body contains in the neighborhood of from 300,000 to 400,000 tons of mixed quality.

At the Bangor and Syracuse mines, the operators have, after difficulties in the sinking of shafts unequalled probably in the history of the Mesabi range, entered the ore bodies and are now engaged in opening up drifts.

The sinking of the concrete shaft at the new Morton mine being opened by Tod-Stambaugh & Co., southwest of Hibbing, is progressing. Surface equipments, including the power houses and other buildings, are practically complete. It is unusual on the Mesabi range that a mine on which a shaft is begun in one year cannot be prepared for shipments during the following year, but the heavy surface at the Morton and the water conditions there to be met will prevent any shipments during 1909.

The Oliver Iron Mining Co. has as usual a large amount of development work under way. The principal stripping operations are being carried on in the Canisteo district at the Canisteo, Walker, Holman and Hill pits; at the Hull-Rust, Sellers and Monroe-Tener mines. It is expected that the coming year on the ranges will be another one of moderate activity and at this time there does not seem to be reason for expecting a greater increase over last year's shipments than may result from increased activity in the last few months of the season.

MELTING METALS IN THE INDUCTION FURNACE.

The Results of Experiments by the American Electric Furnace Co. at Niagara Falls.

The induction furnace has opened a field for electric furnace work in the iron and steel industries, which heretofore has been little exploited. This field comprises the melting of metals, such as iron, steel or brass for casting purposes, and the induction furnace offers advantages in this field which are not possessed by either the commonly accepted melting furnace now in use, such as the crucible furnace, or the types of electric furnaces using electrodes. A great advantage of the induction furnaces for work of this character is the absolute control of the quality of the metal from which the castings are made. The construction of the furnace is such that no impurities are introduced into the metal during the melting process, and, therefore, by charging the furnace with metal of a known analysis, it is reasonably sure that castings will be obtained of a predetermined composition. A consideration of the construction of the furnace will make evident the reasons for these statements.

In Fig. 1 are shown plan and sectional views of a Kjellin induction furnace, as installed at a demonstration plant built by the American Electric Furnace Co., of 45 Wall street, New York, at Niagara Falls, Ont. This company, which controls the Kjellin, Colby and other induction furnace patents, erected a demonstration plant at Niagara Falls, equipping it with a 10 to 20-kilowatt laboratory type, a 40-60-kilowatt experimental type, and a 100 to 150-kilowatt small commercial type steel furnace. In addition to the furnaces, there are suitable casting arrangements, such as ladles, ingot molds, etc.

The induction furnace is in effect a transformer, in which the bath of metal to be melted forms the secondary. The metal being operated on is in a circular trough or annular crucible as shown. A laminated core on which is wound a coil of wire forming the primary is placed concentric with the circular trough. A laminated yoke connects the two extremities of the core passing over, behind and below the trough, as shown. Alternating current being led into the primary coil, a current is induced in the metal in the trough.

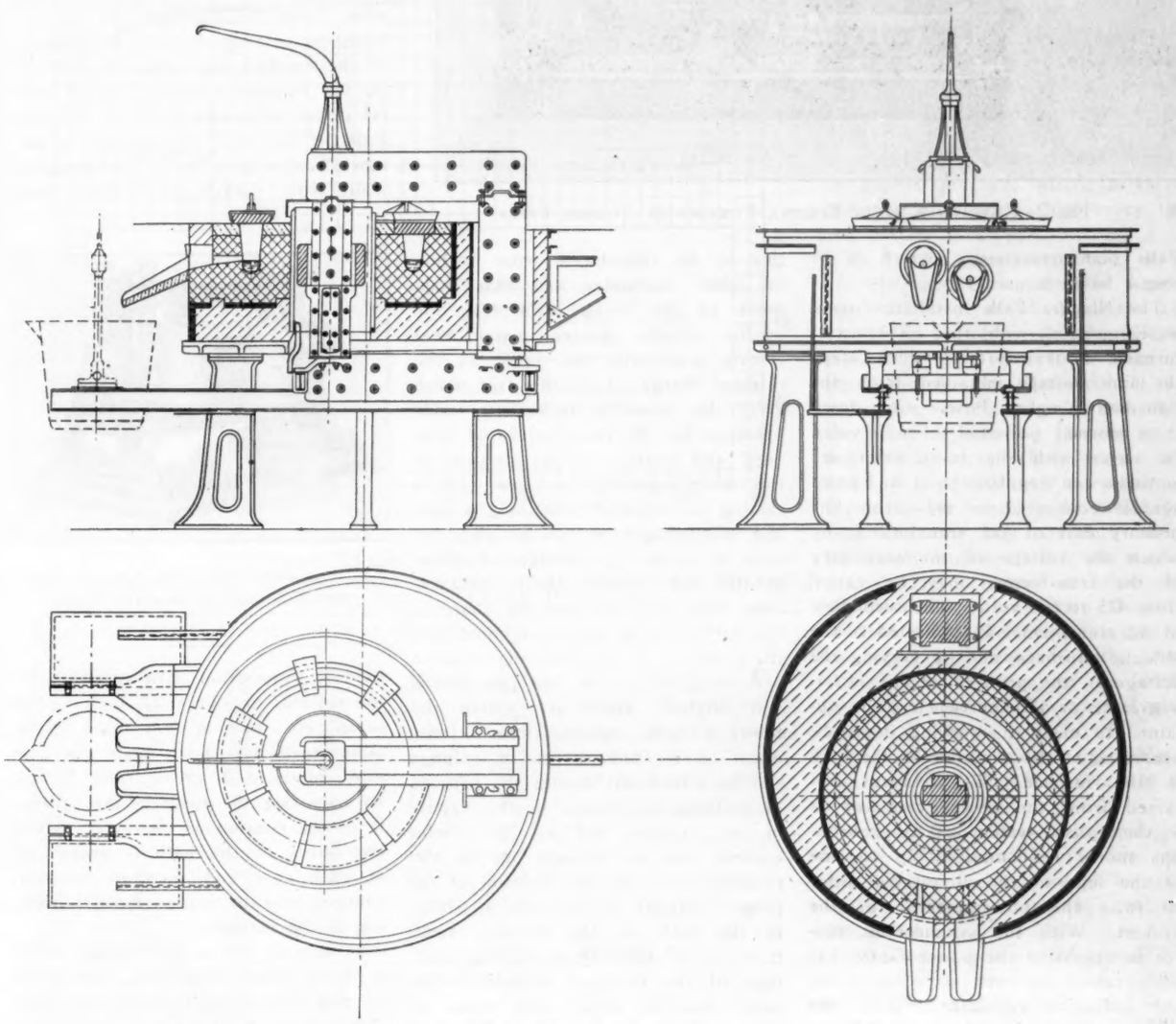

FIG. 1—PLANS AND SECTIONS OF KJELLIN ELECTRIC INDUCTION FURNACE FOR MELTING METALS.

This current has the effect of heating the metal, and there being no escape for the heat, the metal is rapidly fused and soon attains a liquid condition. The lining of the trough is magnesite or dolomite, although any suitable refractory could be used, if it were desired to undertake a refining action in the furnace. For purposes of melting, however, and for accurate control of the quality of the metal, an absolutely neutral lining is essential. At the Niagara Falls plant, magnesite, which is of course basic, is used.

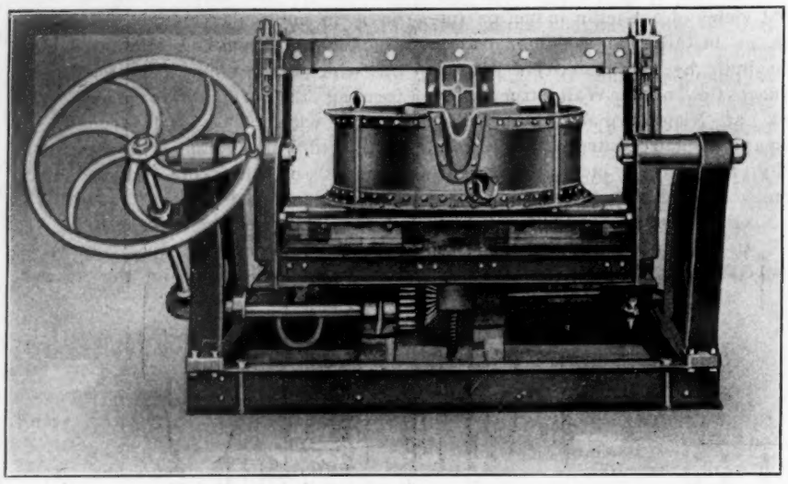

FIG. 2—FIVE-TON KJELLIN ELECTRIC FURNACE AT NIAGARA FALLS.

The Niagara Falls installation uses, in connection with the 150-kilowatt furnace, a transformer which steps the line voltage obtained from the Canadian Niagara Power Co., down to a normal potential of 525 volts. In series with the transformer are an induction regulator and a 5-point contact connected to taps from the primary coil of the transformer, by which the voltage of the secondary of the transformer may be varied from 475 to 600 volts. The secondary of the transformer is connected to the induction furnace, and by varying the voltage in the primary of the latter, a greater or less current can be obtained to meet the varying demands, according to the condition of the bath in the furnace. The current obtained from the power company is on the 3-phase system and a synchronous motor is connected up to one of the legs of the circuit, in order to raise the power factor of the system. With the synchronous motor in operation the power factor has been raised to over 80 when using the induction regulator. With the motor not running the power factor runs along between 60 and 70 per cent. The curve, shown in Fig. 4, is on a run when regulator was cut out.

It is evident from the construction of the furnace that, as the trough containing the metal is covered, there can be little oxidation of the metal in the bath. A little lime is introduced with the metal, in order to form a protecting slag, and to keep the metal from contact with such air as may be in the trough. It is also evident that as there are no impurities to be introduced from carbon or other electrodes and that inasmuch as the lining is neutral, the quality of the molten metal must remain practically the same as the original charge. It is this fact which gives the induction furnace its wide openings for the manufacture of castings, and enables it to conform to the most rigid specifications. If a casting is required containing a certain percentage of silicon, and not over a certain percentage of phosphorus and sulphur these specifications can easily be met by charging the furnace with pig iron containing the required, or less than the required percentage of silicon and phosphorus and sulphur, which are within the limits of the specifications. Inasmuch as no phosphorus or sulphur can be introduced during the process of melting, as occurs in the cupola or air furnace, and as the silicon content can be brought up to the required point by the addition of the proper quantity of ferro-silicon, either in the ladle or the furnace itself, there is no difficulty in making castings of the required analysis. The same remarks apply with equal or greater force to brass melting. At Niagara Falls there has been produced several tons of high silicon steel from the magnesite lining by making ferro-silicon additions to the ladle. The iron was practically carbonless. Great care must, however, be taken to attain these results.

The great drawback in melting brass by the usual methods is the loss of zinc, etc., by oxidation and the more or less imperfect heat control. With the induction furnace these factors are under absolute control, as the covers of the melting trough may be luted down, excluding all air and reducing the chance for oxidation to a minimum, and the temperature is under perfect control, by means of variation in the current in the primary coil.

In steel melting, the Kjellin-Colby furnace illustrated herewith is only intended for melting high grade steels, such as are usually produced in the crucible. It is not intended to compete with the open-hearth or Bessemer process, inasmuch as no refining is attempted, and the quality of the finished steel depends entirely on the material charged. When carrying out demonstrations at Niagara Falls, it has been the practice to use muck bar, washed metal and Swedish white iron. Other metals have been used in connection with special demonstrations, as old rails, boiler plate scrap, etc., and in still other cases, alloy steels have been made and cast into ingots and green sand molds. In operating the furnace, the process is of the continuous character. About two-thirds of the bath is drawn off at each cast and the raw material charged into the molten metal remaining in the furnace.

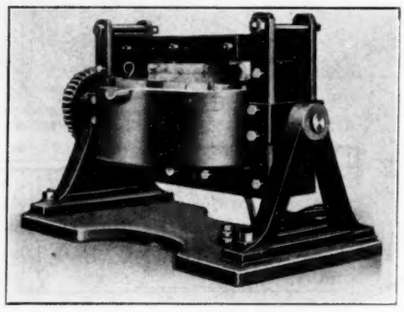

FIG. 3—LABORATORY TYPE KJELLIN ELECTRIC FURNACE AT NIAGARA FALLS.

In drying out a new lining, which is made from magnesite, two rings of cast iron of high quality are used. These are gradually brought up to

their melting point, a suitable pyrometer being used to enable the temperature to be governed accurately. The time consumed ranges from 60 to 70 hours.

The rings are kept at a uniform temperature all around throughout the drying stage, and while they are being melted, a little care is required to maintain the uniformity. When the bath is formed, cold metal is slowly charged until the full amount of 1,800 pounds is added, and a little lime is thrown in from time to time to form the protecting slag. The first cast of 1,000 to 1,200 pounds is run off after about eight hours. The crucible now being thoroughly heated, subsequent charges are made with great rapidity, and although the furnace under discussion is rated at about three tons per day, it can easily produce five to six tons of high carbon or four to five tons of low carbon steel.

As instances of the performance of the furnace, where the residual bath was about 850 pounds, 910 pounds were charged and melted in 68 minutes and poured in 1 hour and 30 minutes. The power consumption was equivalent to 440 kilowatt-hours per gross ton. In another case, in which low carbon steel was melted, the charge was 1,000 pounds and the power consumption was 560 kilowatt-hours per gross ton.

When running off the last heat, all the metal is tapped out of the lower spout of the furnace. The holding down bolts are removed and the casing and old lining removed bodily. A new lining, which has already been built up in a spare casing, is then placed in position and the holding down bolts replaced. The time occupied for changing linings is reduced to a minimum and current can be switched on within one hour of the last cast.

Another advantage offered by the electric furnace in melting metal for casting purposes is the fact that it is unnecessary to entirely drain the furnace at the end of the day's run. If the last cast does not require all the metal which has been charged to the furnace, it is entirely feasible to allow it to remain in the crucible until the next day, merely leaving enough current in the furnace to prevent the metal from freezing. This eliminates a source of loss common in cupola practice, where a certain quantity of metal is lost every time the bottom is dropped.

As to the cost of melting in the electric furnace, it naturally depends upon the price at which electric current can be obtained. At Niagara Falls one man can look after the small furnace installed without any assistance. The number of men about the plant depends on the equipment, but for furnaces where ingots only are cast, and adequate arrangements are made for handling the metal, two men and one boy per turn should be amply sufficient for all requirements. The economy in labor over the crucible process is, therefore, considerable. The lining of the furnace lasts from four to eight weeks, according to the sizes of the furnace and the quality of the material melted.

The following comparison table illustrates the enormous saving in the reduction of steel:

Basing the power consumption at about 750 kilowatt-hours per ton, the cost of melting would be, at a charge for current of ½ cent per kilowatt hour,

750 kilowatt-hours at 0.5 cent	$3.75
Lining, per ton	1.00
Total	$4.75

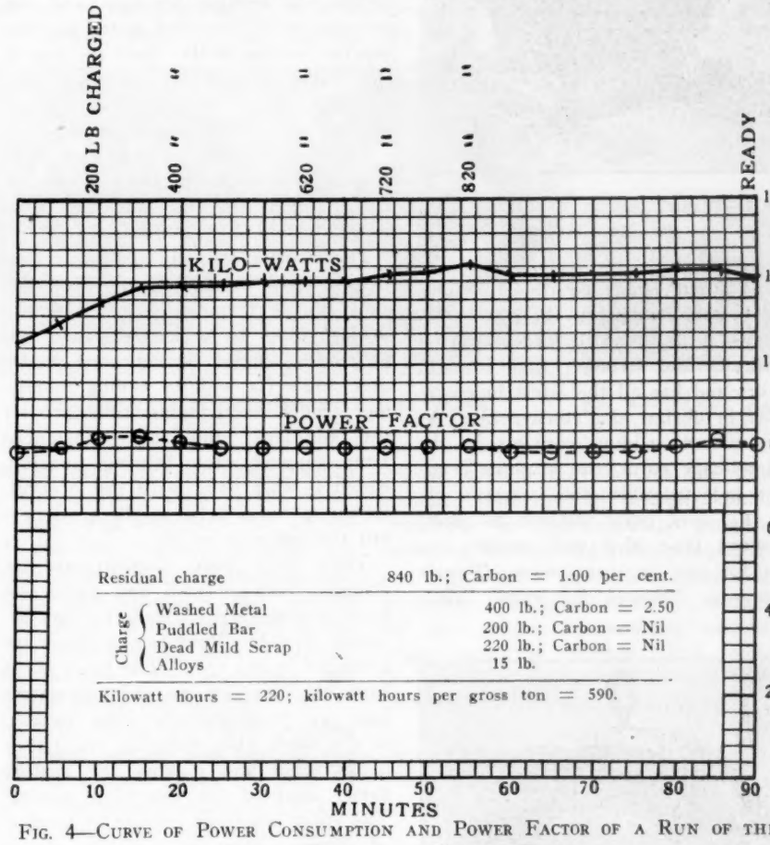

FIG. 4—CURVE OF POWER CONSUMPTION AND POWER FACTOR OF A RUN OF THE KJELLIN FURNACE AT NIAGARA FALLS.

OBSERVATIONS MADE AT THE PLANT OF THE AMERICAN ELECTRIC FURNACE COMPANY, NIAGARA FALLS, CANADA, DEC. 2, 1908.

Time.	Volts.	Amperes.	KVA	Kilowatts.	PF	Remarks.
A. M.						
11:25	590	225	133	105	0.79	Start of charge 840 lbs. in bath.
11:30	590	230	136	110	0.80	
11:35	584	240	140	115	0.82	200 lb. wash metal charged.
11:40	574	250	143	118	0.82	
11:45	574	252	145	118	0.81	200 lb. muck bar charged.
11:50	569	257	146	118	0.80	
11:55	574	260	149	120	0.80	
12 M	569	262	149	120	0.80	220 lb. ingot charged.
12:05	569	264	150	120	0.80	
12:10	567	268	152	122	0.80	100 lb. washed metal charged.
12:15	569	270	154	123	0.80	
12:20	569	274	156	124	0.80	100 lb. washed metal charged.
12:30	559	280	157	122	0.79	
12:35	564	260	158	122	0.79	
12:40	564	260	158	122	0.79	
12:45	559	282	158	122	0.79	
12:50	564	272	153	123	0 80	
12:55	559	272	152	123	0.81	
1:00	554	272	150	120	0.80	Metal all fluid.

Metal in bath at start of charge about 1 per cent carbon.
Wash metal, about 2.5 per cent carbon.
Ingots, about mill carbon.
Muck bar, about mill carbon.
Watt meter: 8,170—7,950 = 220 K. W. hrs.

According to high authority, the life of a crucible is about seven rounds, sometimes more, but generally less, and coal used per ton of steel, about 2,650.

2,650 pounds	$ 3.00
Crucible upkeep	8.00
Total	$11.00

The wastage with this process does not amount to over 2 per cent. The illustration, Fig. 4, is a typical curve of power consumption and power factor of a test run in a furnace at Niagara Falls. The various steps in the process are clearly shown, together with the total energy consumption and the time of each operation. The lower curve shows the power factor, which, it will be noted, dropped as the charge was reduced to a liquid. As the factors entering into the current consumption are all given in the curves the cost of operating a furnace of this type can be estimated wherever the cost of energy is known.

In another test the furnace started with a residual bath of about 850 pounds and the voltage on the primary was 580 volts. The requisite metal was then charged comprising 450 pounds of muck bar and 450 pounds of washed metal. The voltage on the primary was lowered to 475 volts after the charge was completely melted which required about 68 minutes. The slag was then removed, extra care being taken, as an alloy had to be added to the ladle to produce a special steel, the time consumed being 10 minutes after which the voltage was again raised and ferro-manganese and ferro-silicon added. From the time of starting to add the alloys until the first cast, 450 pounds, was made, 12 minutes elapsed. There was an interval of 3 minutes between the first and second casts, to permit of adjustment to the electrical apparatus, when no current was on, and then current was on for 7 minutes while preparing the ladle for the second cast.

Irondale Activities.—The Irondale Furnace Co., Seattle, reports that its furnace at Irondale is ready to blow in and that the blast will probably be turned on May 1. The company is building a complete machine shop at Irondale, is making good progress on its open-hearth plant and has decided to install the following mills: One 22-inch mill, one 14-inch mill, one 9-inch mill and one butt tube mill. It is hoped to have the mills in operation by August 1.

A NEW TYPE OF MILL MOTOR.

The Westinghouse Electric & Mfg. Co., Pittsburg, has just placed on the market its type M-S mill motor for polyphase alternating current circuits. This motor is of the induction type

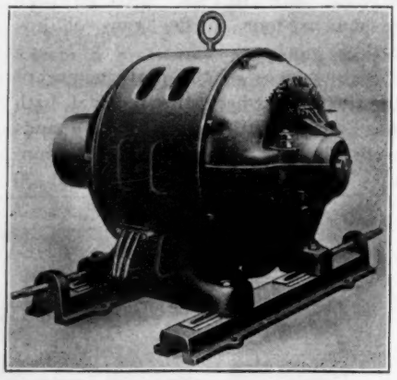

FIG. 1—WESTINGHOUSE INDUCTION MOTOR FOR MILL SERVICE.

with a squirrel-cage rotor. It resembles, in many respects, the old Westinghouse type C motor, except that it is heavier and stronger than the old motors and has all the latest improvements in design and construction. As there are no sliding contacts in the squirrel-cage rotor, the machine is almost indestructible, the bearings being the only parts subject to wear. Standard type M-S mill motors are built for use on three-phase, 25-cycle circuits at 220 and 440 volts. They

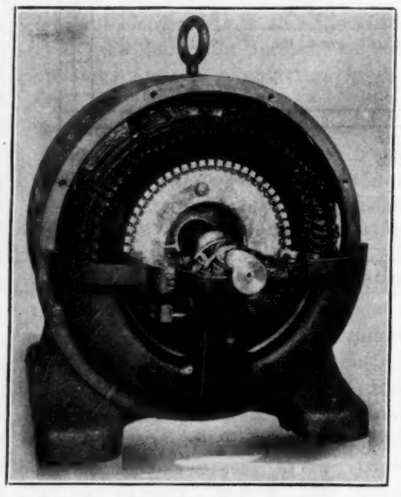

FIG. 2—WESTINGHOUSE INDUCTION MOTOR FOR MILL SERVICE WITH PART OF HOUSING REMOVED SHOWING STATOR AND ROTOR COILS.

are made in nine sizes, ranging from 5 horsepower, at 700 revolutions per minute, to 50 horsepower at 720 revolutions per minute, and in sizes of 50 and 75 horsepower at 475 revolutions per minute.

In construction the frame and bearing brackets are so formed as to give protection to the interior parts, at the same time permitting good ventilation. The frame is a cylindrical iron casting with large supporting feet. The stator core laminations are assembled on horizontal ribs inside of the frame, where they are clamped between end rings keyed in place. The ends of the frame are machined to receive the bearing brackets, and are provided with threaded holes for the bracket holding bolts. Into the top of the frame is screwed a strong eyebolt, by means of which the whole motor can be lifted and transported.

The stator winding consists of form wound coils of heavy copper wire or strap laid in open core slots and held in place by fiber wedges.

The bearing brackets are heavy iron castings with machined rings to fit the ends of the frame. Each bracket is held in place by eight bolts, and can be readily turned through any 90-degree angle for wall or ceiling mounting. Solid overhanging rims protect the windings, and four substantial arms support each bearing housing, which is cast solid with the bracket. Large openings between the arms permit the entrance of air.

The rotor core laminations are clamped between stiff end plates on a cast iron spider, to which they are securely keyed. Ventilating ducts are arranged in the core. The rotor cores have the smallest possible diameters and are comparatively long parallel to the shaft, thus reducing the radius of gyration and making the motors better adapted for reversing service. The rotor windings consist of insulated copper bars in partially closed slots; the ends of the bars are bolted to end rings of heavy sheet copper with large ventilating surface. The contact surfaces between the bars and the rings are well tinned, but no solder is used, so that no harm can result from accidental over-heating. The end rings are securely fastened to each end of the rotor, by three heavy stud bolts. The rings are, therefore, absolutely rigid, and all stress is removed from the ends of the bars. Each end of each bar is held by two bolts, one through each end ring. The bars and end rings cannot slip or vibrate under the heavy stresses caused by quick starts, stops or reversals.

When the motor is operating air

enters the openings in the bearing brackets. The air currents then pass directly outward between and around the end rings, cooling them and the ends of the windings on the rotor and stator. The currents also pass in through the rotor spiders and out through the ventilating ducts in the rotor and stator cores, finally leaving the motor by way of the openings in the frame. This arrangement gives excellent distribution of heat and rapid heat dissipation.

The bearings are large and are rigidly supported in the housings. The shells are of cast iron, split, and lined with babbitt metal. Each bearing shell has three machined bosses, which rest on machined seats in the housing. Lugs and shoulders cast on the shell and the housing prevent the bearing from turning or shifting. The bearings are self-oiling, each having two oil rings. A large opening in the top of the housing with a spring cover provides for inspecting the rings and filling the bearings.

The leads from the stator winding are brought out at one side of the motor far enough above the base to be free from accumulations of dirt and are held in clamps with mica insulating bushings; connections are easily made to cables above or below the motor.

As to operating characteristics, the slip is high enough to give a good starting torque without requiring excessive starting current. At the same time, good commercial efficiencies are obtained. The slip at full load varies with the size of the motors, being greatest with smaller sizes. High starting torque renders these motors especially adaptable to the exacting starting conditions always found with heavy machinery with high standing friction and inertia, and the motors are very serviceable where subjected to heavy temporary overloads. The motors will operate successfully on circuits on which the voltage is within 10 per cent of that at which the motor is rated. They will also operate successfully at some variation from normal frequency, these allowable variations being greater with reduced output.

The starting torque of a squirrel-cage motor depends on the starting voltage. The full line voltage at starting causes a large current flow in both the primary and secondary windings with large resulting torque. Starting torque larger than required by the operating conditions causes unnecessary shocks to the motor and all connected apparatus and the excessive current may disturb the line voltage. The starting voltage should, therefore, be approximately proportional to the starting torque required. An auto-starter provides means for obtaining a reduced starting voltage, and also for a motor-starting current larger than the current taken from the line. The device includes two auto-transformers and a switching device with oil-immersed contacts. The auto-starter is self-contained in a cast iron case, the auto-transformers being mounted in the upper part of the case, together with the switch mechanism, which is attached to the same part. The lower part of the case forms the oil tank, in which the switch contacts are immersed. The case is provided with lugs for mounting against a wall or column. The switch is operated by means of a lever on a shaft running through the lower portion of the transformer case. The lever has three positions which are plainly indicated, namely, off, starting and running. A locking device holds the lever securely in the off position and in the running position until released by the thumb piece in the end of the handle. The handle will not remain in the starting position unless held there by the operator, and on being released returns at once to the off position.

A mechanical device prevents moving the handle directly from the off position to the running position; it must first be moved to the starting position at the extreme left and then moved quickly back past the off position to the running position at the extreme right. If this last movement is slow the handle will be caught and held in the off position. This feature is to prevent allowing the motor to slow down while passing from the starting position where the motor receives less than the full voltage, to the running position where full voltage is applied. Other types of auto-starters may be used in connection with this motor, depending on the service required.

The motor has a wide range of applications in steel mills, cement mills and allied services, it being adapted to running gas washers, fans, pig casting machines, mixers, stone crushers, hot saws, rail straightening and drill presses, shears, bending rolls, punches, bulldozers, charging machines, pipe machinery, roll lathes, ingot carriers, grinders, elevators and conveyors, pug mills, etc.

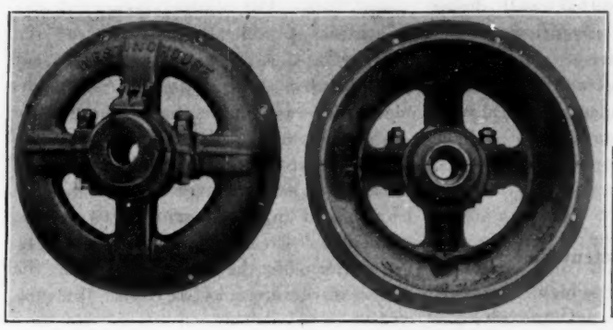

FIG. 3—HOUSINGS OF WESTINGHOUSE MILL MOTOR.

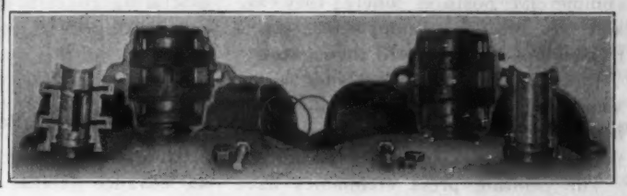

FIG. 4—BEARING PARTS OF WESTINGHOUSE MILL MOTOR.

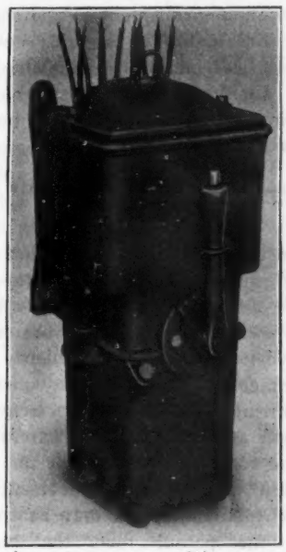

FIG. 5—AUTO-STARTER FOR WESTINGHOUSE INDUCTION MOTOR FOR MILL SERVICE.

MAKING INVENTIONS AND GETTING PATENTS--II[1]

Patentable Inventions.

By John D. Morgan.[2]

It seems hardly necessary to call attention further to the great industries that have been built up on patents. We might mention in passing as representing widely different fields the Bell Telephone Co., the Pullman Palace Car Co., the Eastman Kodak Co., the Mergenthaler Linotype Co., the Carborundum Co., the Westinghouse Air Brake Co., and the Natural Food Co. It is true that the basic patents of some of these corporations have expired but the enjoyment of a monopoly afforded by their patents during the years of building up the business has placed them in a commercial position where they are able to meet all competitors at a tremendous advantage to themselves.

But patents have been a great source of profit to concerns which have not been able to dominate the market to the exclusion of all others.

The printing press companies have always been extensive patrons of the patent office and have taken every care to protect the particular types of presses which they manufacture. The manufacturers of machine tools, steam engines and other standard machines also follow this policy.

But not only have manufacturers found it profitable to protect an entire industrial field or a particular class of machines by patents, but great profits have been realized oftentimes from the patenting of mere "selling points."

On the other hand it cannot be maintained that patents alone are all that is necessary, for like most other classes of productive property good judgment in formulating and diligent and judicious management are necessary. It is asserted sometimes that money has been lost and squandered in inventions and patents, and inventions and patents *in toto* are for this reason condemned. Such reasoning would be on a par with condemning gilt edge stocks because much money has been lost and squandered in wildcat stocks, or despising high-class realty because foolish and unthinking persons persist in buying lots wherever a voluble and plausible promoter chooses to lay them out.

The second point here may be elucidated by going afield for a moment. A certain piece of ground some years since, to my personal knowledge, produced 9 bushels of wheat per acre. Three years after the sheriff's sale the new owner raised 33 bushels of wheat per acre on that field. The old owner said the farm was "no good;" the new owner has always liked the farm.

Enough has been said to call attention to the fact that well drawn patents for useful inventions which have been given wise and diligent attention and management are among the most valuable assets that a manufacturing concern can have.

A brief general consideration might be given to the question of what is patentable.

What is Patentable?

Almost anything which is really an advance in the art to which it pertains is patentable. Do not hesitate to apply for a patent, or rather to seek advice merely because the improvement, from a mechanical standpoint, is slight in your eyes. If it saves time, or money, or yields a superior result, in other words, if it has financial value, it can probably be protected by a patent. This is far from a universal rule, but as a working rule it is probably as good as any that can be given in brief space.

The business man should not constitute himself the judge of whether a certain improvement is patentable. If it is valuable he should seek expert advice on its patentability. If it is not commercially valuable the question of patentability will not interest him.

Preliminary Advice Frequently Valuable.

Consultation with reliable and competent authority on patent questions before a line of improvements is actively entered upon and before money is invested therein is frequently very advantageous. Unpleasant questions of infringement may be frequently avoided and the scope of patent protection secured may often be increased through such preliminary consultation. Thereby valuable data may be secured from the patent files, the relation thereof both legally and mechanically to the problem in hand fully explained in advance of expenditure of time and money. Such information so easily secured in advance may, however, through neglecting such consultation, be first brought home as testimony in an infringement suit after time and money have both been expended.

I have in mind a case where a large machine was to be built involving considerable time and expenditure in special machinery, jigs, fixtures, patterns, etc. The entire design of the machine, as well as the plans of the inventor, were laid before the patent counsel for the company. As formulated it was found that the machine infringed no less than eight patents notwithstanding the fact that its basic principles were novel. A little time was spent in consultation between the inventor, the patent attorney, the manager of the company and the shop foreman. As a result the machine was redesigned so as to have a clear field and this was done without any real sacrifice of its good points in any way. In this case a small sum of money spent in precautionary investigation gave large immediate returns. There is no doubt that much infringement litigation can be avoided in this way.

The Basis of Patent Grants.

The granting of patents by the federal government is based on a provision of the constitution which states that:

"The congress shall have power * * * to promote the progress of science and useful arts, by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries."

Various laws were passed for the purpose of carrying out the constitutional provision just quoted, but we can pass at once so far as concerns the purposes of this article to the law now in force.

Who Can Take Out Patents?

Sec. 4886 of the revised statutes provides in part:

"Any person who has invented or discovered any new and useful art, machine, manufacture, or composition of matter, or any new and useful improvement thereof, * * * may, upon payment of the fees required

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[1]The first article of this series was published in The Iron Trade Review of March 18, 1909.

[2]220 Broadway, New York; member of the New York Patent Bar.

by law, and other proceedings had, obtain a patent therefor."

In the first place it will be noted that "any person" who is an inventor in the classes enumerated may secure a patent. There are certain requirements to be complied with, but they are not directed to the person of the inventor. The term "any person" puts on an equality minors and those of legal age, men and women, citizens and foreigners. A corporation, although a person in certain legal senses, is not included in the term as here used, as it obviously could not perform the mental act of invention. The application must be made by the inventor himself, if living. If he dies after making the invention and before applying for a patent, his executor or administrator can make the application, or, if he dies while the matter is pending before the patent office his executor or administrator may, by proper proceedings, take up and complete the application. In certain other countries, however, application for patent may be made by others than the inventor, including corporations. In this country the patent may issue to anyone designated by the inventor, as to one or more individuals or corporations.

The law states also that improvers, or inventors of improvements, may secure patents within the field of their invention, and in this provision lies at once one of the chief elements of weakness and also of strength of our patent system. Strength, in that it gives to each inventor legal protection for what he does; weakness, in that it permits the issuing of overlapping patents, which frequently are productive of much litigation.

The Classes of Patentable Inventions.

The law quoted above enumerates four classes of patentable inventions, namely:

(1.) Arts. (2.) Machines. (3.) Manufactures, and (4) Compositions of Matter.

An attempt at accurate definitions of these classes would be of no service here, but examples of each class will give a much better idea of what they are:

(1.) An art covers what is commonly known as a process, and perhaps the best known example is the Bessemer steel process.

At one time it was practically held by the supreme court of the United States that a process to be valid must employ some elemental force, such as some physical or chemical agency. For instance, in Bessemer's process, the combination of the oxygen of the air blast with the carbon, silicon and phosphorus of the molten iron at the high temperature within the converter are an essential part of the process.

Of recent years, however, another class of processes has been given patent protection by the patent office and such patents have been upheld by the courts. A process claim for hulling peas on the vine was declared valid by the circuit court of appeals, which process consisted in taking pea vines and dropping them from an elevation and subjecting them to impact from strikers while being so dropped so as to burst the pods and dislodge the peas. It will be seen that this is a purely mechanical process.

The court of appeals of the District of Columbia has also held to be patentable a process for stretching a piece of leather in a particular manner so as to fit it as the cover of a polishing pad for a buffing machine.

An art may consist in a new way of producing an old article, as for instance, the holding by means of pneumatic pressure of a cigar wrapper during the making of a cigar. While this may have effected economy in the manufacture there was obviously no difference in the finished cigar.

Patents have even be granted for doing an old thing in a new way. One such patent was granted for a process of pasteurizing beer which consisted in continuously moving the bottles through the pasteurizing agent when it was already well known to move the pasteurizing agent continuously with reference to stationary bottles filled with beer. This patent was granted largely upon a showing that there was great saving in the number of bottles burst during the pasteurizing operation and which of course constituted an advance in the art such as would be entitled to patent protection.

The addition of a single new step to a process has been held to confer patentability upon the process, even when that step might have been performed accidentally by others at prior times without realizing its importance and without reaping its advantages. This point was decided by the supreme court in a somewhat celebrated case between the Carnegie Steel Co. and the Cambria Iron Works, where the novel step consisted in keeping at all times of a relatively large quantity of molten metal in a cistern which was supplied from a plurality of blast furnaces in order that the product as drawn off from the cistern might have a more constant average carbon content.

The telephone was protected by a process claim in these words:

"The method of, and apparatus for, transmitting vocal or other sounds telegraphically, as herein described, by causing electrical undulations, similar in form to the vibrations of the air accompanying the said vocal or other sounds, substantially as set forth."

Where a process results in a new product it is quite possible that both the process and the product are patentable. The courts have held recently that a new way of folding a box and the box resulting therefrom were both patentable. It will be noted that the process employed here is what is denominated above as a mechanical process.

A process involving the addition of a small portion of aluminum to molten iron or steel just prior to its being poured into the mold for the purpose of deoxidizing the metal was held to be patentable for the particular use although this property of aluminum in general was previously known.

The class of arts or processes, has been exemplified rather widely above, but it is believed that this is justified by the fact that many valuable inventions of this class are allowed to go unprotected by patent because the inventors or owners do not realize that they are patentable.

It is not, however, always advisable to patent a process, as for instance, where the products are such that it would be almost impossible to prove infringement and the process may be practiced secure from observation. This class of processes, however, will be treated later in connection with the subject of "Trade Secrets."

(2). No definition of a machine is necessary, as it is used in the patent law in its ordinary meaning as understood in the mechanical world. A watch, a valve gear, a printing press, a set of rolls or a threshing machine might be taken as examples of machines.

(3). A manufacture is difficult to define briefly and clearly in the abstract. It may be stated generally to include *manufactured* or mechanical things which are not machines, things which depend upon men for the determination of their properties and field of usefulness. Illustration of this would be golf balls, on which much money has been made in the last few years, or a window sash fastener such as is sold from door to door, or one of the popular toys or puzzles that sweep over the coun-

try as unaccountably and irresistibly as measles or a war scare.

(4). A composition of matter is something formed by the intermixture of a plurality of ingredients, but which has properties different from those of its ingredients. Its properties or field of usefulness depends upon the laws and forces of nature. The inventor here merely brings them into such relation and under such conditions that such laws or properties may become effective. Carborundum is a well-known example of a composition of matter and vanadium steel is another. Water is a composition of matter, but is hardly patentable at this date. A furniture polish has been held patentable as a composition of matter, the ingredients therein in the proportion specified being capable of producing an effect different from that of the several elements.

As indicating what is not a composition of matter a prescription might have one ingredient to produce one effect on a patient and another to produce another effect, but the effect of each medicine is not modified by the other. This would not be a composition of matter. In fact, so-called patent medicines are not protected by patents but are frequently protected by a trade mark upon the name or wrapper.

Working on Contract.—The Westinghouse Electric & Mfg. Co. and the Westinghouse Machine Co., East Pittsburg, Pa., are now at work upon the large contract received some time ago from the Pennsylvania Railroad Co. for the electrification of its New York terminals, including the tunnels and terminals of Jersey City and those of Long Island. The contract calls for the building of two 12,000-horsepower steam turbines, direct-connected to electric generators of equivalent capacity, and two steam turbines of 4,000 horsepower each, direct-connected to generators, giving the plant a total rated capacity of 32,000 horsepower. One hundred electric railway motors of 200 horsepower each will be supplied for installation on coaches. The purchase of a number of electric locomotives and other electrical apparatus is involved by the contract.

Topton, Pa., stack of the Empire Steel & Iron Co. which has been out of blast since November, 1907, was lighted March 8. The capacity of the stack has been increased about 300 tons per week.

MANGANESE STEEL.[1]

By W. S. Potter.

Manganese steel usually means a metal of the following composition:

	Per Cent.
Manganese	11. to 13.
Carbon	1. to 1.20
Silicon	0.25 to 0.40
Phosphorus	0.06 to 0.11
Sulphur	0.02 to 0.06

Balance of analysis iron.

It might be stated that the manganese content must lie between 8 and about 35 per cent.

The lower limit of manganese in steel which would be recognized as manganese steel is determined by the fact that alloys having between 7½ per cent and 5½ per cent of manganese are extremely weak and brittle and that the characteristic strength and toughness can only be given to steels having more than 8 per cent of manganese.

The upper limit of manganese in manganese steel is determined partially by the cost of manganese metal which is about 50 cents per ton unit, when the addition is made by means of ferro-manganese. Also the high carbon content of ferro-manganese interferes with the physical properties induced by manganese. When enough ferro is added to make a steel with manganese 20 per cent, the carbon begins once more to dominate and a steel results which is stiff and brittle when cold, and unworkable when hot.

At present commercial manganese steel has a comparatively narrow range of analysis.

Steels containing manganese from 9 per cent to 11 per cent are very good and it may be found in rails, for example, that steel containing from 10 to 11 per cent manganese, and with a suitable proportion of carbon, will have higher elastic limit than steel containing over 11 per cent of manganese. With carbon low, manganese high, and water quenching from about 1,000 degrees Cent., the elastic limit is low, and the flow excessive for many duties.

Steels containing manganese about 11 per cent and carbon 1.10 per cent. for example, have a higher elastic limit than steel with manganese 15 per cent and carbon 0.8 per cent. Before deciding that steel containing less than 11 per cent manganese would be most desirable for rolled rails it should be remembered that the peculiar merit of manganese steel in resisting abrasive wear results from the combination of strength and ductility. The most ductile steel which has at the same time a sufficiently high elastic limit to avoid distortion in the service for which it is intended will be the best in each case. Some very good results have been obtained in cases of small additions of chromium and vanadium. Both of these metals raise the elastic limit without serious loss of elongation or shock resistance. For the present, it is safe to define commercial manganese steel as a steel containing about 11 per cent manganese, 1 per cent carbon, and with or without small additions of chromium.

[1]Abstract of a paper read before the Western Society of Engineers, Chicago, Feb. 17, 1909.

Physical Properties.

Hardness.—On the scleroscope scale Bessemer rail shows hardness of about 30, manganese steel shows hardness of 40 to 50, chilled cast iron 65 to 75.

Manganese steel has usually been defined as a very hard and tough metal. However, it is only moderately hard, but is rather very strong and tough. The confusion between the apparent hardness and actual great strength has arisen from difficulty experienced in drilling and machining this steel.

Magnetic Properties.—A bar of manganese steel balanced on a knife-edge remains in balance when acted upon by the field of a very powerful electro-magnet. An electro-magnet which would lift two tons of soft steel, when laid upon a block of manmanganese steel gives so small a pull that the hand recognizes no increased weight in lifting the magnet. A coil passing a current and acting as a solenoid on a bar of manganese steel develops no magnetic quality. Very thin cuttings of manganese steel are not lifted by a strong magnet, but if these cuttings are hammered into very thin foil they may then be lifted by the magnet. From these considerations it would appear that this steel might be used to advantage about motors and generators, in a crank shaft, for example.

Specific Heat.—This ranges from 0.145 at ordinary temperatures to about 0.20 at 1,200 degrees Cent.

Heat Conductivity.—This property has not been properly determined, but between ordinary temperatures and 600 degrees Cent. appears to be about one-third that of low carbon steel.

Electric Conductivity.—This has been determined carefully on manganese steel rails in comparison with Bessemer rails, and the resistance of manganese steel rails averaged 3.4

times the resistance of the Bessemer rails. At temperatures between 100 degrees Cent. and about 600 degrees Cent., the electrical resistance remains nearly constant.

Strength as Affected by Temperature.—Manganese steel melts at about 1,330 degrees Cent., or about 190 degrees below dead soft carbon steel. Below +395 degrees Cent. and above —190 degrees Cent., the steel seems to have nearly the same strength, toughness, shock resistance and hardness as at ordinary temperature.

Coefficient of Friction.—A series of tests were made on the brake shoe testing machine of the American Brake Shoe & Foundry Co. to determine the co-efficient of friction between chill cast and steel tired wheels and the Bessemer and manganese steel rails. It will be seen from an examination of the attached reports of the tests that when a total pressure between the rail and chilled iron wheel was 3,000 pounds the coefficient of friction was greater between the Bessemer rail and the wheel than between a manganese steel rail and the wheel but that in all other cases the coefficient of friction was much greater between the wheels and the manganese rail than between the wheels and the Bessemer rail.

Tests on Chilled Wheels at 20 Miles Per Hour.

3,000 POUNDS PRESSURE.		
Time of stop, seconds.....	27	21
Length of stop, feet.....	412	340
Mean pull, pounds	543	623
Mean coefficient of friction, per cent	18.17	20.73
Area of rail in contact with wheel, square inches.....	2.14	1.42
4,000 POUNDS PRESSURE.		
Time of stop, seconds.....	18.5	17
Length of stop, feet.....	273	272
Mean pull, pounds	736	502
Mean coefficient of friction, per cent	18.39	12.06
Area of rail in contact with wheel, square inches.....	4.27	2.58
7,000 POUNDS PRESSURE.		
Time of stop, seconds.....	14	11
Length of stop, feet.....	222	181
Mean pull, pounds	1,128	822
Mean coefficient of friction, per cent	16.11	11.19
Area of rail in contact with wheel, square inches.....	3.35	2.78

The rails tested were sections of manganese and Bessemer steel, 85 pound rails, approximately 12½ inches long. These sections were curved to give the applied surface of the rail a 16½-inch radius to fit a 33-inch car wheel. The bottom of the rail was turned up on the ends, for an end-stop, and in the center for a lug, as nearly an M. C. B. brakeshoe back as possible.

The sections of rails were tested on a brakeshoe testing machine at 20 miles per hour, and under pressure of 3,000, 4,000, 7,000 pounds, on both a chilled and a steel tired wheel, the latter being a bald wheel. Both wheels were 33 inches in diameter. The rails were given three applications at each load on each wheel, and the averages of these three tests were taken. The rails became slightly warm during each test but were cooled after each application.

Tensile Tests.—The early papers of R. A. Hadfield mention tensile tests of forged specimens of manganese steel showing a tensile strength about 150,000 pounds per square inch, and elongations as high as 50 per cent. The values found on the best specimens of manganese steel obtainable from various sources, in an exhaustive series of tests conducted several years ago, showed a tensile strength of the cast metal averaging about 82,000 pounds per square inch, elongation 30 per cent, elastic limit 45,000 pounds per square inch. The rolled specimens tested at the same time averaged tensile strength 135,000 pounds per square inch, elongation 35 per cent, elastic limit 60,000 pounds per square inch. Forged specimens averaged tensile strength 142,000 pounds per square inch, elongation 38 per cent, and elastic limit 55,000 pounds per square inch.

Although considerable progress has been made in the manufacture of manganese steel during the last three years, these values are still approximately correct on good specimens of cast, rolled and forged steel prepared by commercial methods.

As previously stated the elastic limit of manganese steel can be raised considerably above the traditional values by introducing a small quantity of chromium and other elements and more particularly by properly heating and working the metal.

From tests and experiments made it appears that the tensile strength of commercially rolled manganese steel will generally lie between 135,000 and 140,000 pounds per square inch, elongation between 30 and 40 per cent, and the elastic limit will usually lie between 60,000 and 70,000 pounds per square inch. In many instances, however, the steel of ordinary composition shows an elastic limit of about 75,000 pounds per square inch, and in a few cases where chromium and other elements have been added, the elastic limit has been as high as 85,000 pounds per square inch. Tensile strength and shock resistance do not seem to be lowered by chromium when the steel contains up to about 1 per cent of chromium. The elongation is very rapidly lowered when chromium is above about 0.505 per cent, so that when chromium is above 1 per cent the elongation is below 20 per cent.

Abrasive Wear Values.—The well-known high abrasive wear value of manganese steel seems to depend upon its ability to flow and endure repeated distortions of the wearing surface without surface fractures, which would result in the constant loss from the surface of small pieces.

Manganese steel resists abrasive wear which is of the character of heavy impact of hard substances better than it resists abrasive wear which is of the character of sliding attrition of hard particles, or wear which is like the action of an abrasive wheel.

Heat Treatment.

Upward of 75 years ago men in Sheffield, England, understood that steel containing moderate additions of manganese had certain properties which could be described as those of carbon steel, and that steels containing a higher percentage than 5 per cent were very weak and brittle.

Some 30 years ago the Hadfields, father and son, or their associates found, and the son advertised the fact that castings and forgings containing the higher percentages of manganese, after heating to a high temperature and quenching in water, were very strong and tough and that the treated steel had a remarkable resistance to abrasive wear. The proportion of manganese mentioned as suitable for track work castings, in Hadfield's early patents is 11 per cent. No heat treatment was mentioned in the early papers, but later a treatment was announced and consisted in heating the casting at first slowly and then rapidly to 800, 900, or 1,000 degrees Cent.,

Tests on Steel Wheels at 20 Miles Per Hour.

3,000 POUNDS PRESSURE.		
Time of stop, seconds.....	22	21
Length of stop, feet.....	348	331
Mean pull, pounds	736	448
Mean coefficient of friction, per cent	24.53	14.19
Area of rail in contact with wheel, square inches.....	4.3	5.14
4,000 POUNDS PRESSURE.		
Time of stop, seconds.....	17	15
Length of stop, feet.....	265	245
Mean pull, pounds	833	694
Mean coefficient of friction, per cent	20.81	17.36
Area of rail in contact with wheel, square inches.....	6.59	5.27
7,000 POUNDS PRESSURE.		
Time of stop, seconds.....	11.5	10
Length of stop, feet.....	190	170
Mean pull, pounds.....	1,206	1,120
Mean coefficient of friction, per cent	17.23	16
Area of rail in contact with wheel, square inches.....	6.6	7.51

and immediately quenching in water. No theory covering the necessity of this reheating and quenching was given.

Manganese steel of ordinary composition poured in a layer about ¼ to ½ inch thick in a chill mold will, when cold, bend double, and has all the usual toughness of reheated and quenched manganese steel. Castings from the same ladle of steel poured in sand molds have a toughness approximating the toughness of the reheated and quenched metal in inverse proportion to the thickness of the sand-cast section. For example a sand-cast section ½ inch thick will usually bend from 45 degrees to 90 degrees before it breaks by cold bending. A section 2 inches thick usually breaks in cold bending, before it is deflected as much as 20 degrees. The thinner section is whiter and has smaller crystals than the heavy sand-cast section, and the chill-cast section is still whiter and has still smaller crystals than the thin sand-cast section. The three specimens heated to 1,000 degrees Cent. and quenched in water exhibit in each case a very remarkable and practically equal degree of toughness. In all these cases the steel has practically the same hardness. The chill-cast specimen before reheating is the hardest, the sand-cast specimens are slightly softer and the reheated and quenched specimens are the softest. If the specimens are now heated to 700 degrees Cent., or even a little lower temperature, held for, say one half hour at this temperature, and cooled slowly to ordinary temperature and broken, they are surprisingly weak, and as a rule, bend but slightly before breaking. The crystals are very large and it is obvious that no strong cementing materials are present to bond the crystals. A section 3 inches thick cooled slowly from the heat of casting, and put under a drop weight will break about as readily as an equal thickness of a fair quality of gray iron and will frequently show crystals with a mirror surface as large as 1¼ by 1 inch. For the most part such a section so treated and broken will show crystals about ¼ inch to ⅜ inch on a side. A specimen heated to above 700 degrees Cent. and cooled slowly to below 600 degrees Cent. is very weak. If this specimen is reheated to 700 degrees Cent. and quenched in water only a slight increase in toughness is noted. The crystals are still apparently as large as ever. The bond between the crystals is almost as weak as before, and yet from the other tests it is clear that the steel crystallizes or re-crystallizes considerably below 700 degrees Cent.

Comparing this steel with a carbon steel it is obvious that the cementing materials are not taken into solution at as low a heat in the manganese steel as in the carbon steel. In the carbon steel, the size of crystals, strength, toughness, etc., may be redetermined any number of times by reheating to 700 degrees Cent., and cooling, and as is well known, the physical properties are governed by the rate of cooling.

The manganese steel after being put in a weak condition due to slow cooling from 700 degrees or above is only put in a condition of maximum toughness by reheating to a much higher temperature and then cooling rapidly enough to prevent either mechanical or chemical separation.

A comparison of color carbon tests with determinations of total carbon by combustion, shows that the slow cooled steel has a much smaller amount of carbon in the condition which permits of the determination of carbon by color than the manganese steel which has been rapidly cooled.

Manganese steel is readily burned when heated, and this burning is more difficult to avoid as the temperature is higher. For this reason it is usual to heat for quenching only to a point sufficiently high to give the characteristic toughness in the quenching metal.

If castings or other finished shapes are reheated for toughening to a high temperature they are to be very generally affected with deep cracks. To avoid burning and cracking the reheating is generally stopped at about 1,000 degrees Cent.

Rolling.

A very small ingot rolled with small reductions in each pass to a ⅞-inch square and worked until at about 600 degrees Cent., was cooled in the air on an iron floor and bent 180 degrees around a radius of ½-inch without checking or cracking. The bar had a maximum strength and toughness and the color carbon test was within two or three points of the determination of carbon by combustion.

A large ingot, however, rolled to a section such as the head of a rail, and finished at 700 degrees Cent. and then cooled in the air, left the metal in a coarsely crystallized, weak and imperfect condition. In order to make this larger section of proper strength and ductility it is necessary to reheat and quench in water. This reheating will inevitably remove the excellence due to work and there will always be a doubt as to whether the rail has not been burned or cracked in the reheating prior to the quenching.

Theoretically a specially constructed and very heavy mill might roll a rail beginning at 1,000 degrees Cent. and ending at 700 degrees or above. But before the temperature has fallen as low as 700 degrees Cent. the steel is so stiff that only very slight reductions and alterations of forms can be executed in one pass in the rolls of an ordinary mill.

In a rolling mill of the American type where the power and strength of the mill is at a commercial maximum, and the time in rolling between the soaking pit and the hot bed is frequently less than five minutes, the drop in temperature is usually about 900 degrees Fahr., or about 500 degrees Cent. and it is clear that in such a mill, manganese steel ingots heated in an ordinary manner could not be rolled beginning with a temperature of say 1,025 degrees Cent. and under, and ending the work with a temperature of the finished rail as high as 700 degrees Cent. If the rail is finished too cold, the work is excessive, and the steel is very uncertain as to quality. On the other hand, an ingot or bloom heated to a high heat and burned or cracked in the heating will crush in the rolls and no rail will result.

If a cast bar, for example a round bar 1 inch diameter, is heated carefully to a red heat to avoid cracking due to strains, then plunged in a bath of melted gray iron or melted copper, then withdrawn and examined by bending, it is found to be very generally affected with cracks which extend from the skin to the center of the bar. The piece then breaks exhibiting a surface along the line of one of these cracks, and shows a peculiar columnar fracture.

A piece of cast manganese steel heated in an ordinary manner in a heating furnace to a temperature much above 1,000 degrees Cent., removed from the furnace and tested cold, either with or without quenching, exhibits these cracks and this peculiar fracture. The steel is easily broken in heating to temperatures above 1,025 degrees Cent. or thereabouts.

A rolled shape is finished at a temperature higher than would be the case if a specimen of carbon steel were similarly heated and worked, because the specific heat of manganese

steel is considerably higher than that of carbon steel and its coefficient of conduction is very much lower.

Specifications for Rolled Manganese Steel Rails.

As specifications for manganese steel rails are likely to be written in the near future, the following points are submitted as suitable for incorporation:

Rails from any heat to withstand the standard drop test of the American Maintainance of Way Association.

Tensile Test Bars.—To be cut cold from head, web and base of rail to give a tensile strength above 100,000 pounds per square inch, elastic limit above 55,000 pounds per square inch, elongation above 20 per cent.

Bending Test.—Flat strips cut from head, web or base of rail to bend 180 degrees around a diameter twice the thickness of specimen without evidence of failure and at temperature between ordinary atmospheric temperature and —60 degrees Fahr. This will insure the toughness which determines wear value.

Manufacture.—Composition to be:

	Per Cent
Manganese	10.00 to 13.00
Carbon	0.95 to 1.15
Silicon	0.20 to 0.40
Phosphorus	under 0.10
Sulphur	under 0.06

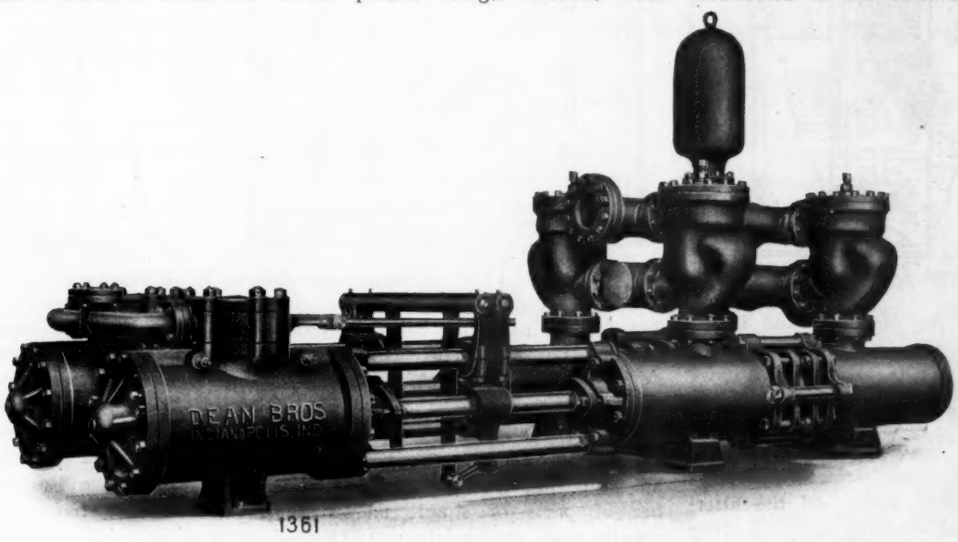
Ingots to be cast of weight sufficient to produce four 30-ft. rails from an ingot and in such a manner as to be free from pipes. Rails to be rolled to finished size from ingots in not to exceed three heats including the heat of casting. Rails not to be reheated after rolling. Finished rails to meet the standards of the American Maintenance of Way Association as to smoothness, dimensions of section, etc.

A HEAVY DUTY DUPLEX PLUNGER PUMP.

The accompanying illustration shows a heavy duty duplex plunger pump built by the Dean Bros. Steam Pump Works, Indianapolis. The pump has four cylinders in all, two on each pump. These are steel castings designed for a working pressure of 250 pounds per square inch. The plungers are of bronze and outside packed, the metal being hard composition. The plungers are self-draining and work through deep stuffing boxes. The valve pots containing the valves and seats are mounted on pump cylinders. The valve seats screw into the valve pots and are therefore removable. The valve seats, stems and springs are of bronze.

The steam valve gear is the Dean Bros. patent design without rock shafts. The maker calls especial attention to the following features: The levers turn on studs and the frames are made with polished steel rods. The valve levers are similar and interchangeable and the valve gear can be removed and reassembled in a few minutes.

The steam cylinders have an extra heavy steam chest cover, and are tested to 400 pounds pressure to the square inch. Water cylinders are tested to 500 pounds pressure per square inch.



THE DEAN BROS. DUPLEX HIGH DUTY PLUNGER PUMP.

power plants, gas and gasoline engines. It is made in both the unit and duplex types, and, with the exception of the smallest size, all are provided with a steam radiator.

The filter cases are of galvanized iron and the unit type has a partition through the center, while the duplex type has two or more partitions, according to the size, which separate the clean oil section from that to be filtered. The clean oil is not disturbed when the filtering section is being cleaned. It is an effective arrangement for continuous oiling systems.

Referring to the illustration, which shows the duplex type, the interior of the filtering section consists of a tank A, to which is connected a tube having attached to it cone deflectors Connected to the bottom of tank A is a coarse mesh wire screen cylinder G covered with filtering material H, through which the oil must pass on its way to the clean oil section. Inside of the tank A in the smaller filters is placed a perforated bucket into which the dirty oil is poured. The larger filters have a receiving tank.

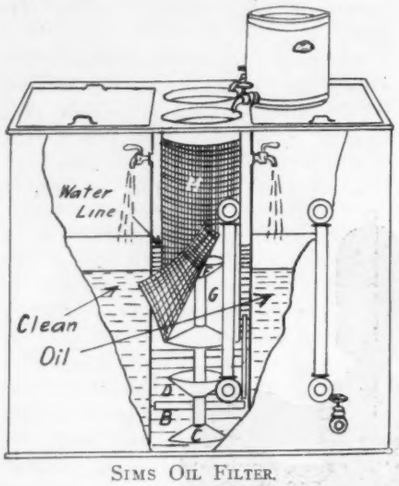
In operation the filtering section is filled with water to about the level shown in the illustration, and the dirty oil is poured into the bucket, which removes the coarse impurities. The oil will then descend through the tube, as indicated by the arrow, and reaching the cone C, it will ascend through the perforations and gather on the cone D. Leaving this cone, it will gather on the inside of cone E, whose diameter is larger than that of D. It leaves this last cone through the perforations and gathers

THE SIMS OIL FILTER.

The accompanying illustration shows the construction of the Sims oil filter for use in connection with lubricating systems for engines and other machinery. The filters are made in a variety of sizes, the smallest sizes being especially designed for small

on cone F, and finally ascends into the body of oil floating on the surface of the water. The function of the cones is to distribute the oil in a thin film over a large surface as it passes upward through the water, giving an opportunity for a thorough washing.

Having reached the inner portion of cylinder G, the oil passes through the filtering cloth H, whence it flows through the faucet I into the clean oil section. This faucet is designed to regulate the filtration, and is usually closed to a point where nearly all the oil in the tank A will have disappeared before the next quantity is poured in.



SIMS OIL FILTER.

The filter may be cleaned by removing the inner structure of the filtering section, taking off the filtering cloth and washing it. The dirty water may be removed and replaced with clean water, after which the cloth is replaced on the cylinder and the process continued, as above. The filter is built in six sizes, ranging in capacity from 2 to 3 gallons per day to 30 to 50 gallons per day, respectively. The filter is built by the Sims Co., Erie, Pa.

THE DUFF - BETHLEHEM FORGED STEEL HYDRAULIC JACK.

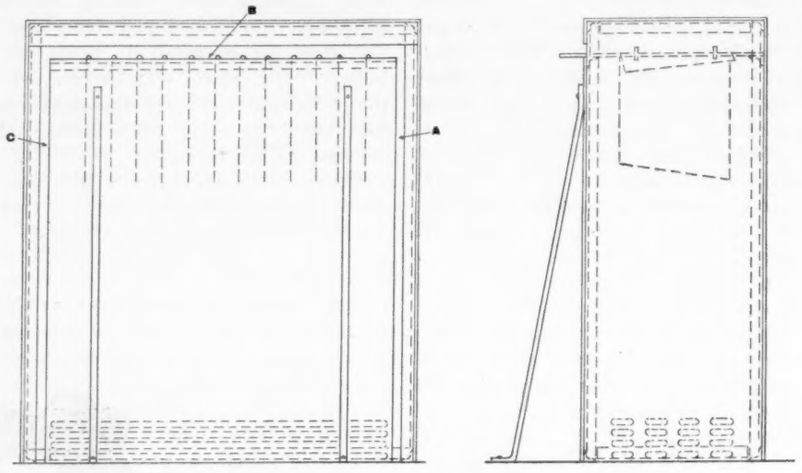
The Duff Mfg. Co., Pittsburg, has placed on the market the Duff-Bethlehem forged steel hydraulic jack. These jacks are forged entirely from steel and are built under patents issued to the Bethlehem Steel Co., which designed and perfected it and which will do the special forging necessary in its manufacture. The advantage of jacks of this type, as stated by the manufacturer, are that they weigh from 30 to 60 per cent less than hydraulic jacks of ordinary construction and of equal lifting capacity and stroke and are considerably stronger and more durable in a given size. Both the cylinder and ram of these jacks have a solid bottom, dispensing with joints and packing at this point. The cylinder has its base or bottom forged integrally, thus obviating the necessity of packing. Another packing which is dispensed with is that for closure of the ram piston from the pump socket. The ram bottom is solid and forged integrally with the pump socket. The jacks are capable of extending their full length in a vertical, horizontal or inclined position and without any adjustment, and all sizes will operate at any angle. In the operating mechanism a minimum number of parts of simple and strong construction are used, any one of which may be replaced without special tools. The valves may be given attention without removing the packing or the packing without removing the valves. These jacks are made in all sizes and capacities adapted to general lifting purposes.

DUFF-BETHLEHEM FORGED STEEL JACK.

A RACK FOR DRYING BLUEPRINTS.

BY MILES A. HARRIS.

Comparatively few manufacturing firms have any method of drying blueprints aside from lines of wire or rope running at varying angles across the blueprint room. The drying closet shown in the accompanying sketch was noted recently in a prominent bridge company's office. It is made of very light plate steel and angles and is heated by a number of steam pipes laid in the bottom and fed by exhaust steam from the engine room. The wet blueprint is hung on a thin rod as shown, enters through aperture "A" and is removed through aperture "C" when dry. The closet struck the writer as being very simple in construction, especially convenient in use, and slightly above most methods which have come under his notice.



A DEVICE FOR DRYING BLUE PRINTS.

An Elaborate Catalog.—The Chicago House Wrecking Co., Chicago, has issued a new and very elaborate catalog, No. 682, describing bargains in many lines, including machinery, hardware, steel, cable rope, building material, electrical fixtures, safes, vaults, tanks, pipes and plumbing. The period of business depression has afforded the company numerous opportunities to take advantage of sales, and a large amount of merchandise, which is now offered for sale, has been purchased. The company's plant occupies a site of over 40 acres, and has 31 separate departments.

C. McElroy, 388 Greenwood avenue, Detroit, Mich., has purchased some iron ore lands in British Columbia, a few miles north of the Washington boundry line, where he plans to erect a small blast furnace.

THE INDUCTION DRIVE APPLIED TO PLANERS.

In THE IRON TRADE REVIEW of June 11, 1908, was described the Steckel induction drive. The drive, as then presented, was designed for application to rolling mill tables and to hoists. Changes have been made in it and it has been further perfected, so that its application to the driving of tools having a reciprocating motion, such as planers, is now possible. We present herewith illustrations showing the drive as thus developed. The theory and action of the mechanism were thoroughly described in the earlier article and it is unnecessary to go further into details than to say that the induction drive transmits power without contact between its driving and driven members. A magnet coil is provided, which produces a flux, which flows through a number of interrupted pole pieces, in the gap of which is placed a copper ring attached to the driven member. The slip of the copper ring between the pole pieces induces eddy currents which cause it to revolve and drive the gear attached to the machine which the induction drive operates. The drive is, in effect, a short circuited induction motor.

In Fig. 1 is shown the arrangement of a 25-horsepower drive used in connection with a 48-inch heavy planer. It will be noted that the motor shaft carries on either end an induction clutch, the driven member of which is geared to a shaft which drives the main shaft of the planer through miter gears. An idler gear between the driving gear of the induction clutch and the driven gear on the driving shaft causes the motion of the shaft to be in the opposite direction than when driven by the other clutch. In operation the planer table throws a switch which causes the exciting current to flow through the magnet coil of first one drive and then the other, causing the motor to drive through first one clutch and then the other, giving to the table its reciprocating motion.

The drive is made in two styles known as the self-contained type shown in Fig. 2, and the independent type shown in Fig. 3. In the self-contained type, Fig. 2, the two induction clutches are mounted on either end of the motor shaft. The driven member of one clutch drives the planer driving shaft through two pairs of helical machine cut gears, set so as to neutralize the thrust on each other. The other induction clutch drives through a Renold silent chain gear. The use of the chain gear gives a motion to the driving shaft of the planer opposite to that given it by the helical gear and thus no idler gear is required.

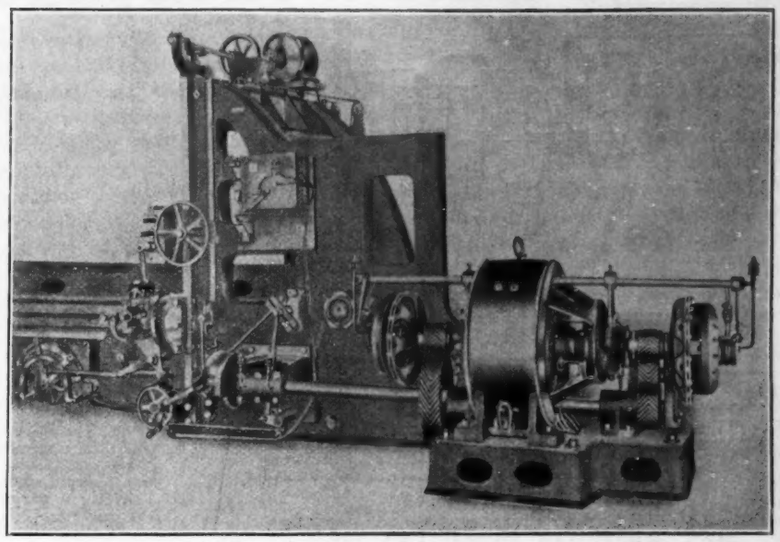


FIG. 1—THE STECKEL INDUCTION DRIVE AS APPLIED TO A 48-INCH HEAVY PLANER.

The arrangement of the independent drive, as shown in Fig. 3, comprises a stand on which the two induction drives are mounted between bearings, the motor being separate and attached to the clutch by means of a flexible coupling and gearing. The ratio between the cutting and return speeds of the planer table is taken care of by a proper ratio in the gearing between the clutches and the planer-driving shaft. A variation of cutting speed, when wanted, is accomplished by means of a shunt field rheostat attached to the rocker on the planer.

The self-contained type of drive is made in the following sizes: From 5 to 25 horsepower at a fixed cutting speed; from 5 to 20 horsepower where the range of cutting speed is in the ratio of 1½ to 1; from 5 to 15 horsepower where the range of cutting speed is in the ratio of 2 to 1; and in sizes of 5 to 10 horsepower where the range of cutting speed is in the ration of 3 to 1. The independent type is made in sizes from 25 to 75 horsepower, where the cutting speed is fixed, in sizes from 20 to 75 horsepower where the range of cutting speed is in the ratio of 1½-to 1, and in sizes from 15 to 75 horsepower where the range of cutting speed is in the ratio of 2 to 1. The independent type may also be used without a motor, where power is obtainable from a line shaft. No countershaft is required in such a case. A wide belt from the pulley on the line shaft to a pulley on one of the drive shafts is all that is required.

Among the advantages of this type

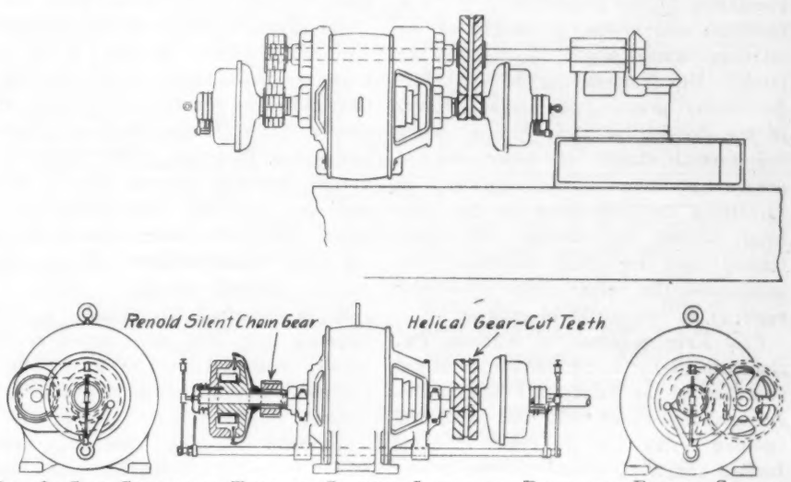


FIG. 2—SELF-CONTAINED TYPE OF STECKEL INDUCTION DRIVE FOR PLANER SERVICE.

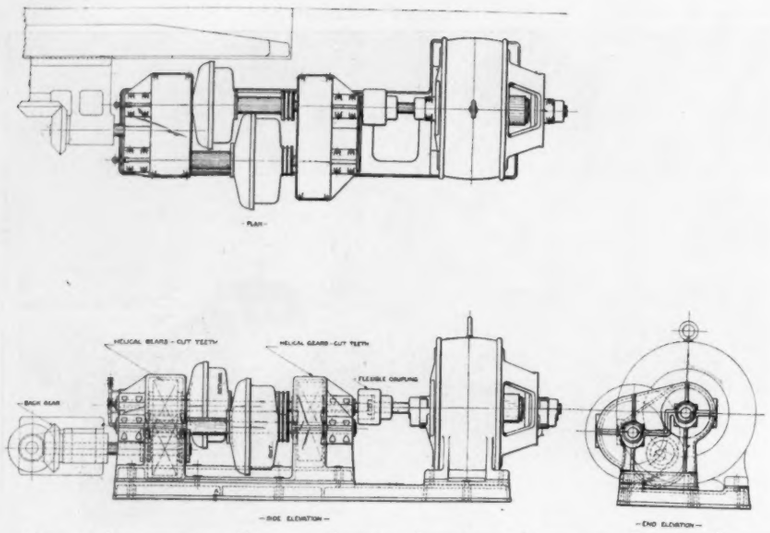


FIG. 3—INDEPENDENT TYPE OF STECKEL INDUCTION DRIVE FOR PLANER SERVICE.

of drive for planers is that it eliminates all shifting belts, noise, wear and destructive heating of the planer parts with a consequent expense for repairs. The reversal of the planer is accompanied without shock or noise. The Steckel induction drive is built by the Wheeling Mold & Foundry Co., Wheeling, W. Va.

INDUSTRIAL EDUCATION DISCUSSED.

Industrial education furnished the subject for discussion at the regular monthly meeting of the Pittsburg Foundrymen's Association held at the Fort Pitt hotel, Monday evening, March 1, and emphasis was laid in the addresses given upon the need of a more systematic training of the youth, if the productive supremacy of the United States is to be maintained. Dr. A. A. Hamerschlag, director of the Carnegie Technical Schools, spoke upon the importance of the technically trained mind to the modern industrial establishment in the conserving of the properties of the raw materials and in the prevention of the startling waste which is now to be noted. Dr. Hamerschlag believed that the equity practiced by manufacturers in the division of their profits among the several classes of labor was of great importance to the employers in furnishing the inspiration to the technical schools for turning out highly trained men for these positions. He emphasized the value of the productive engineer to the world in general.

Paul Kreutzpointner, of Altoona, Pa., chairman of the committee on industrial education of the American Foundrymen's Association, spoke of the industrial training system now in vogue in some foreign countries, which contrasted very unfavorably with the scattered efforts in this line being done in the United States. He pleaded for more systematic industrial training of the youth between the ages of 14 and 16 years. The topic of the evening was discussed by members of the association.

J. S. McCormick, of the J. S. McCormick Co., Pittsburg, told of the progress being made by the membership committee of the association. Henry Spilker, of Sterritt-Thomas Foundry Co., chairman of the committee on permanent exhibit of foundry appliances, reported that his committee had received much encouragement from the manufacturers and was preparing to circulate a general letter among the foundrymen to insure their loyal support of the undertaking.

LAKE SUPERIOR IRON ORES.

The Cleveland-Cliffs Iron Co. has issued its annual booklet giving analyses of Lake Superior iron ores of 1908, and guarantees for 1909. The ores handled by this well known company are as follows:

Old range Bessemer: Lake Bessemer, Ashland, Negaunee Bessemer, Iron Belt Bessemer, Abbotsford, Castleford, Jackson; old range non-Bessemer: Lake, Negaunee, Globe, Austin, Bedford, Clinton, Cambridge, Princeton, Cliffs Shaft, Castleford, Imperial, Section 16; old range silicious: Chatford, Lake Silica, Clinton Silica, Iron Belt Silica, Tilden Silica; old range manganiferous: South Jackson.

M. A. Hanna & Co., dealers in Lake Superior iron ores, have issued an unusually attractive booklet giving cargo analyses on such ores as they handle, as follows:

Bessemer—Melrose, New Era, American Crushed, American Lump, Republic Crushed, Russell and Saginaw. Non-Bessemer—Montrose, New Era No. 2, Cambria, Lillie, Republic Basic Lump, Florence and Hollister. Manganiferous—Newport and Bonnei. Silicious—Richmond.

WORCESTER NEWS NOTES.

Worcester, Mass., March 20.—The Wire Goods Co., maker of wire specialties, is to build a six-story brick addition, 40 by 80 feet, to its plant. The enlargement is not because of increased business but rather to make room to divide the work into departments.

The Wright Wire Co. suffered a fire loss of $100,000 the morning of March 20, because an auxiliary fire alarm system failed to work. The old part of the plant, including the power house and office were destroyed, thus stopping the part of the plant not injured and throwing 300 men out of work. The company has a branch plant at Palmer, Mass., and is a progressive concern. The part of the plant destroyed was at one time the plant of the Wood & Light Machine Co., maker of machine tools, during the sixties and seventies. The loss is fully covered by insurance and rebuilding will commence after the insurance is adjusted. One impressive feature of the fire was the manner in which wire glass withstood the flames, where ordinary panes of glass would have broken in, thus spreading the fire more rapidly.

SOUTHERN PACIFIC CAR SHOP.

San Francisco, March 16.—The Southern Pacific R. R. Co. has just commenced the construction of car shops at Roseville, about 100 miles from San Francisco, that will be 1,500 feet in length and 150 feet wide. More than three miles of track will be laid in the shop, which will be equipped with all kinds of machinery for wood and iron work. It will be entirely separate from other large car repair shops to be constructed for the Pioneer Fruit Co. on the opposite side of the yards for the repair of refrigerator cars used in connection with the great ice and pre-cooling plant now being completed. This plant will be 900 feet long and capable of accommodating a whole train of loaded freight cars going through the cooling and icing process. There are 300 men employed on the work now and 700 more will be added to the force very shortly.

No Market Shock from Tariff Bill

Little improvement as respects activity was shown in the New York stock exchange transactions during the week. The movement of prices was also somewhat insignificant. All in all, the market did not show any great disturbance over the announced terms of the new tariff bill.

The general market remained dull Monday. All grades of copper metal were reduced ¼ cent a pound, and an accompanying break occurred in London. A trifle more of activity was shown Tuesday, and the close was firm and higher. All grades of copper were again reduced ⅛ cent a pound. On the Crucible Steel dividend declaration, the stock gained 4½ points over the previous day. Wednesday, after the publication of the proposed tariff law, the market rallied. Less activity was shown Thursday, and the price changes were small. Shares advancing in the early trades Friday, weakness again developed on the heavy selling of Steel common, which declined a point and closed at the lowest. Shares were extremely dull Saturday, and prices were slightly lower.

Call loans ranged from 1¾ to 2 per cent throughout the week. Gold to the amount of $5,700 000 was engaged for export to London during the week, one-half going to a large joint stock bank direct instead of the Bank of England, as heretofore. Gold to the amount of $7,000,000 or $8,000,000 will be shipped to London this week. Aggregate sales of bonds continued to show normal shrinkage when compared with the total sales in February and January. Gross earnings of 53 railroads reported for February increased 9 per cent, compared with last year.

Bank clearings in the United States showed a moderate improvement over recent weeks, and were 16 per cent heavier than the corresponding week a year ago. The arrival at New York of 9,412 immigrants Friday, half of them from southern Italy, was declared connected with Sicilian earthquake. Commercial failures for the week were 249, compared with 283 the preceding week and 323 the corresponding week last year. Actual figures of clearing house banks showed surplus increased $6,036,050; loans decreased $16,594,500; deposits decreased $14,707,000, and the ratio of reserve, 26.5 per cent, an increase of 0.5 per cent. Non-member banks and trust companies showed loans decreased $6,975.100; total deposits decreased $6,181,400; reserve decreased $3,462,400, and the ratio of reserve 19.3, an increase of 0.1 per cent. Shares were sold to the number of 2,630,920, compared with 2,026,963, the preceding week, and 3 936,460 the corresponding week last year. Bonds, exclusive of government bonds, were sold to the amount of $16,039,000, compared with $15,876,0 0 the preceding week and $10,222 000 the corresponding week last year.

THE LEADING INDUSTRIAL SECURITIES.

	Closing Quo. Mar. 20	Changes in Week	Date 1909 Ann. M't'g.	Stock Outstanding	Basis	Dividend Last Declared	Dividend Date Last Div. Pay.
Allis-Chalmers	13	.....	Sept. 2	$19,820,000		.....	.....
Allis-Chalmers pr	43⅛	+ ⅜		16,150,000	7 cum	1¾ Q.	Feb., 1904
American Can	8⅛	+ ⅛	Feb. 2	41,233,300		.....	.....
Am. Can pr	74	—1½		41,233,300	7 cum	1¾ Q.	Jan., 1909
Am. Car & Foundry	48⅛	— ⅛	June 24	30,000,000		½ Q.	Jan., 1909
Am. Car & Fdy pr	110¾	+ ¼		30,000,000	7 n. c.	1¾ Q.	Jan., 1909
American Loc	51	+ ¼	Oct. 19	25,000,000	5	1¼ Q.	Aug., 1908
American Loc. pr	111½	.....		25,000,000	7 cum	1¾ Q.	Jan., 1909
American Ship	58⅜	.....	Oct. 13	7,600,000	4	1 Q.	June, 1908
American Ship pr	104	.....		7,900,000	7 n. c.	1¾ Q.	Oct., 1908
Am. Steel Foundries(new)	35⅜	.....	Dec. 2	17,184,000		.....	.....
Am. Steel Foundries, pr	47½	.....		17,240,000	6 cum	1	Aug., 1904
Barney & Smith	40	.....	June 1	2.000,000	4	1 Q.	Sept., 1907
Barney & Smith, pr	95	.....		2,500,000	8 cum	2 Q.	June, 1908
Bethlehem Steel	21⅜	+ ⅜	April 6	14,862,000		.....	.....
Bethlehem Steel, pr	49	.....		14,908,000	7 n. c.	¾ Q.	Feb., 1907
Cambria Steel	34	—1	March 16	45,000,000*	6	1½ S. A.	Feb., 1909
Cambria Iron	46¼	— ¾		8,468,000*	4	2 S. A.	Sept., 1908
Chicago Pneumatic Tool	22	.....	Feb. 15	6,145,800	4	1 Q.	Oct., 1907
Colorado Fuel	32	.....	Oct. 18	34,235 500		3½	April, 1902
Crucible Steel	7	+ ½	Oct. 20	24,578,400		.....	.....
Crucible Steel, pr	57½	+3⅞		24,436,500	7 cum	1 Q.	Mar., 1909
Empire Steel	6	.....	April 27	1,254,770		.....	.....
Empire Steel, pr	46	—1		2,500,000	6 cum	1½ S. A.	Jan., 1909
Fay & Egan	95	.....	Feb. 18	1,000,000	6	1¾ Q.	Nov., 1908
Fay & Egan, pr	125	.....		1,000.000	7 cum	1¾ Q.	Nov., 1908
General Electric	153½	+ ¾	May 11	65,178,800	8	2 Q.	Jan., 1909
Harbison-Walker	17	+ ¼	Jan. 18	18,000,000		½	Oct., 1907
Harbison-Walker, pr	80	.....		9,600,000	6 cum	1½ Q.	Jan., 1909
International Pump	36⅝	— ½	June 8	17,762,500		1	April, 1905
International Pump, pr	84¾	.....		11,350,000	6 cum	1½ Q.	Feb., 1909
Lackawanna Steel	30	.....	March 10	34,971,400		.....	.....
Lake Sup. Corp	18½	— ¼	Oct. 6	40,000,000		.....	.....
New York Air Brake	85⅛	+1⅝	June 17	8,012,500	8	2 Q.	Oct., 1907
Niles-Bement-Pond	100	.....	Feb. 3	8,500,000	6	1½ Q.	Mar., 1909
Niles-Bement-Pond, pr	100	.....		2,000,000	6 cum	1½ Q.	Feb., 1909
Otis Elevator Co	48	—1	March 15	6,375,300		1½ S. A.	April, 1909
Otis Elevator Co., pr	93	—2		6,295,000	6 n. c.	1½ Q.	April, 1909
Penn. Steel	50	.....	May 10	10,750,000		.....	.....
Penn. Steel, pr	103	—1		16,500,000	7 n. c.	3½ S. A.	Nov., 1908
Pittsburg Coal Co	10¼	.....	March 9	28,104,600		.....	Nov., 1906
Pittsburg Coal Co., pr	42½	+1⅜		27,071,800	7 c.	1¾	April, 1905
Pressed Steel Car	36¼	+ ⅞	Feb. 17	12,500,000		3	Aug., 1904
Pressed Steel Car, pr	97¼	.....		12,500,000	7 n. c.	1¾ Q.	Feb., 1909
Pullman	170⅛	+ ⅛	Nov. 10	100,000,000	8	2 Q.	Feb., 1909
Railway Stl. Spring	36½	+1⅛	March 4	13,500,000	4	1 S. A.	Oct., 1908
Railway Stl. Spring, pr	100	—1¼		13,500,000	7 cum	1¾ Q.	Dec., 1908
Rep. Iron & Steel	20½	+ ½	Oct. 20	27,191,000		.....	.....
Rep. Iron & Steel, pr	70½	— ½		20,416,900	7 cum	1¾ Q.	April, 1908
Sloss-Sheffield	72	+ ¼	March 10	10,000,000	5	1¼ Q.	Mar., 1909
Sloss-Sheffield, pr	108	.....		6,700,000	7 n. c.	1¾ Q.	April, 1909
U. S. Pipe & Fdy	27	+ ½	June 23	12,500,000	4	½ Q.	Dec., 1907
U. S. Pipe & Fdy., pr	70	.....		12,500,000	7 n. c.	1¾ Q.	Sept., 1908
U. S. Steel	43½	— ⅞	April 19	508,302,500	2 n. c.	½ Q.	Mar., 1909
U. S. Steel, pr	110	— ⅜		360,281,100	7 cum	1¾ Q.	Mar., 1909
U. S. Steel 5s	102⅞	— ⅛		463,798,000	5	5 A.	.....
Va. Iron, Coal & Coke	57	.....	Sept. 21	9,073,680		.....	.....
Westinghouse Elec	79	+1½	June 16	27,173,200	10	2½ Q.	Oct., 1907
Westinghouse Air Brake	107	+3	Oct. 5	14,000,000*		2½ Q.	April, 1909

Par value of shares, $100, except those starred (*), $50.

Copper Stocks.

New York.—Amalgamated Copper closed 68¼, a net gain of ¼.

Boston.—Butte Coalition closed 22⅝, a net loss of ⅜; Calumet & Arizona closed 100, no change; Calumet & Hecla closed 620, a net loss of 10; North Butte Mining closed 67⅝, a net loss of 1⅛; Quincy Mining closed 85, a net loss of 2⅞.

Financial Notes.

The American Brake Shoe & Foundry Co. declared the quarterly dividend of 1¼ per cent on common, and the regular quarterly dividend of 1¾ per cent on preferred, both payable March 1. The Otis Elevator Co. declared the usual yearly dividend of 3 per cent on common stock, payable in two semi-annual installments, the first on April 15 and the second Oct. 15. The usual quarterly dividend of 1½ per cent was declared on preferred payable April 15. The Union Switch & Signal Co. declared the usual quarterly dividend of 3 per cent on common and preferred stock, both payable April 10.

NEWS FROM MANY INDUSTRIES

New Buyers:

The Benton Zinc Co., Benton, Wis., with $20,000 capital stock has been incorporated by J. V. Swift, S. J. Kearns and James Quinlin.

Paul Jaeschke, Charles Kirchhahn and Alfred Jaeschke are the incorporators of the Standard Ground Key Works, Milwaukee, which has a capital of $25,000.

The Franklin Machinery Co., capitalized at $50,000, has been incorporated by treasurer E. W. Shook, J. P. Coffman, and H. A. Clawson, all of Franklin, Pa.

Articles of incorporation have been granted to the Illinois Cutlery Co., Blue Island, Ill., capitalized at $10,000. Charles Haas, Robert Krueger and Fred W. Koenecke are the incorporators.

The Allentown Foundry Co., Allentown, Pa., with a capital of $50,000, has been granted a charter. The directors are Harry C. Trexler, George O. Albright and George T. Hersh, all of Allentown, Pa.

The Hydro-Vacuum Machine Co., Cincinnati, has applied for a charter. The capital stock is placed at $25,000, and those named in the application are: Harry W. Brown, Allen W. Brown, M. B. McIntyre and John H. Miller.

The Bi-Cal-Ky Auxiliary Spring Co., Buffalo, to manufacture auxiliary springs for cars, trucks and vehicles, with $100,000 capital stock, has been incorporated by Charles H. Bicalky, Charles H. Lockwood, Ferdinand J. Bommer, Buffalo, N. Y.

The Illinois Cutlery Co., 138 Jackson Boulevard, Chicago, to manufacture and deal in tools and cutlery, with $10,000 capital stock, has been granted a certificate of incorporation through Charles Hans, Fred W. Koenecke and Robert Krueger.

The Centaur Motor Co. of Illinois, New York Life Building, Chicago, has applied for a charter to manufacture motors and accessories, with $10,000 capital stock. The incorporators are: Arthur M. Robbins, Robert E. Haley and Albert E. Lake.

The Bosworth & Damon Tool Co., Portland, Me., has been organized to manufacture and sell tools and machines. The capital stock is $250,000, and the officers of the corporation are: President, C. H. Burdin; treasurer, C. F. Tennant, and clerk, W. H. Gulliver, all of Portland.

The Frank Richard & Gardner Co., New York City, has filed application for a charter to manufacture mill and ship supplies, foundry and factory supplies, etc., with a capital of $8,000. The incorporators are Frank Richard, William H. Gardner, Thomas W. Cresse, and Christopher G. Connor, 160 South street, New York City.

The Christopher Cunningham Co., Brooklyn, N. Y., boilermaker, foundryman and metal worker, capitalized at $25,000, has been incorporated by Christopher Cunningham, 627 Greenport avenue; Frederick F. Jaennot, 1192 St. Johns place, both of Brooklyn, and Henry C. Hunter, 30 Church street, New York City.

The Eccentric Packing & Engineers' Supply Co., New York, has been granted a certificate of incorporation, with $20,000 capital stock. The incorporators are William H. Martin, 439 West Forty-fourth street; Eugene H. Griffin; 606 West 115th street; Chandler A. Oakes, 50 Pine street, all of New York City.

A charter has been granted to the Bergesen Mfg. Co., New York City, machine shop and foundry, capitalized at $25,000. The incorporators are: John Gergesen, 261 East Thirty-first street, Brooklyn; Clarence C. Dunbaugh, 74 Broadway, New York City, and Frank Lawrence, 357 Fifty-first treet, Brooklyn, N. Y.

The Hurwitz & Finkelstein Iron Works, New York City, has been granted a charter to manufacture structural and ornamental iron work, with $3,000 capital stock. Those interested are: Louis Hurwitz, 1355 Washington avenue; Hyman Finkelstein, 152 East 111th street; Samuel Greenfield, 85 East Ninety-ninth street, all of New York City.

A certificate of incorporation has been granted the Red Star Sales Co., New York, manufacturer of boiler compounds, machinery and engines, with $10,000 capital stock. The incorporators are: E. J. Forhan, J. J. Harper, H. M. Browne, 154 Nassau street, New York City.

The Grinden Art Metal Co., Brooklyn, N. Y. has been incorporated to manufacture small metal products, with an authorized capital of $25,000. The incorporators are William J. Grinden and Joseph A. Grinden, 330 Lafayette avenue, Brooklyn, and Charles A. Nellis, 219 Myrtle avenue, Flushing.

The Sandblom Iron Works, Brooklyn, N. Y., has been incorporated with $100,000 capital stock to engage in the manufacture of structural iron and steel. The incorporators include Gus Sandblom, 247 East Nineteenth street, Brooklyn; Lauritz U. La Cour, Flushing, L. I., and John T. Booth, 271 Broadway, New York City.

The Eller Mfg. Co., New York City, to manufacture and deal in sheet metal, tin and tin plate, with $10,000 capital stock, has been granted a charter. Those interested are: J. F. O'Dea, Canton, O.; John C. Monnet, 333 West Twenty-eighth street, New York City; C. E. Stevens, Newark, N. J.

The Lincoln Tool & Supply Co., New York City, to manufacture hardware, tools and cutlery, has been granted a charter with $5,000 capital stock. Those interested are: William Davidson, 100 St. Nicolas avenue; William C. McKeon, 545 West 144th street; Lavina F. Meader, 230 Eighth avenue, all of New York city.

New Construction:—

The Badger Brass Mfg. Co., Kenosha, Wis., has purchased a site for proposed extensions to its plant to be built during the summer.

The Oil City Foundry, Oil City, Pa., has just finished installing a department for the manufacture of cast iron pipe of small diameter at its plant.

August Jeske, Milwaukee, has taken out a building permit for a brass foundry, to cost $84,700, on Cawker place, between Thirtieth street and the Milwaukee railroad tracks.

The Portland Ship Building Co., South Portland, Me., has now under construction a new building 30 x 80 feet, to be used as a machine and engine building shop, as well as a repair shop.

Stout & Parke Foundry & Machine Co., Carthage, Mo., whose plant was recently damaged by fire, advises that it has rebuilt, is now running full time and will not need new equipment.

The work of replacing the old building housing the socket department of the Wheeling Steel & Iron Co., Wheeling, W. Va., has been begun. The old building had become frail and unsuitable.

The Morrison Construction & Salvage Co., Rochester, N. Y., bridge and structural iron builder and erector, advises that it does not contemplate a plant for the fabrication of material, as it confines its operations to erecting solely. Its formal incorporation was noted in the March 4 issue.

Authoritative announcement has been made that an addition will be built to the Decatur, Ill., shops of the Illinois Traction system, on which work will

be started at once. The main building will be a woodworking shop 48 x 300 feet, which will be equipped with new machinery, a large part of which will be especially built. The amount authorized for the building and machinery is $100,000.

The Western Crucible Steel Casting Co., 2849 Grand avenue, Minneapolis, has purchased additional land for the purpose of tripling the size of its plant. The additional land has 120 feet frontage on Grand avenue and 80 feet on Pleasant. It is estimated that the improvements will cost $25,000.

Plans have been drawn by the Chester Steel Casting Co., Chester, Pa., for an additional building 100 x 150 feet, in which a new department for the manufacture of "blown steel" will be opened. It will depend upon the condition of the steel market, however, as to just how soon this improvement will be started.

The Connellsville Iron Works, New Haven, Pa., advises that the increase of its capital stock recently noted is for the purpose of installing new machinery which will include bending rolls and several additional machines. An addition to the main building will also be constructed, the dimensions of which have not been fully determined.

The Boston Insulated Wire & Cable Co., Dorchester, Mass., has closed a contract with the Aberthaw Construction Co., Boston, for the construction of a concrete mill, comprising a main building 82 x 180 feet, two stories, a one-story vulcanizing building 25 x 95 feet, and an engine and boiler room, 30 x 50 feet. The construction work will be started April 1.

The Standard Ground Key Works Co., Milwaukee, whose incorporation is noted in another part of this issue, is planning to build a plant on Fond du Lac avenue at Thirty-first street, to cost $6,000. It is planned to enlarge the capacity of the plant at present located at 2416 Wright street. New equipment will be installed, material having arrived on the ground.

The Jones Tractor Co., Colby, Kans., has erected a temporary shop building, 30 x 70 feet, for the purpose of building gasoline traction engines. It is expected to have the first engine built by April 1. The company has not yet incorporated, the partners being: H. E. Jones, J. N. Fike, William Walker Jr., H. M. Fike, J. W. Haynes and Guy Fike.

The Kelly Mfg. Co., Waterloo, Ia., has announced through President H. B. Kelly that it will remove from the Sycamore street location to the building on Folks avenue, lately occupied by the Waterloo Farm Fence Co. The Kelly company has purchased the three story building, 80 x 160 feet. The new site will furnish the Kelly company with improved shipping facilities. The increasing volume of business has compelled the move, and it is expected that the change will be effected by April 1. Recently, the capital stock of the company was increased and larger facilities will be added in the new building.

Ground has been broken for the erection of a work shop 200 x 320 feet for the Joliet Bridge & Iron Co., Joliet, Ill. The shop will probably cost $125,000, and will practically treble the capacity of the plant. A 50-ton crane will be placed in the new building. The employes of the company are themselves erecting the frame work of the shop, which it is expected will be completed Aug. 1.

The Industrial Works, Bay City, Mich., has placed all orders for equipment and material for this year relative to its new foundry, which includes a new gray iron foundry under the same roof. The steel equipment will include a 10-ton open hearth steel furnace operating by oil, built from a design by W. M. Carr, of New York City. The company advises that this year it will go no further probably than equipping the foundry for making gray iron castings, and that the steel foundry may go over for another year.

The purchase of a new site by the Frontier Iron Works, Buffalo, recently noted, includes an L-shaped tract, with 100 feet frontage on Grant street and 330 feet frontage on Letchworth street, running back about 200 feet to the New York Central tracks. Five buildings will be erected, four foundry buildings, 90 x 240 feet, 40 x 125 feet, 60 x 100 feet, 28 x 120 feet, and a brass foundry 40 feet square. They will be brick construction, one story. It is expected that work will be started April 1, and that the plant will be ready for occupancy by July 1.

The American Multigraph Co., Cleveland, advises respecting the proposed additions recently noted, that it is adding two stories to its main building, which will increase its floor space 13,000 square feet. It has been found necessary to enlarge its assembling department and certain machine departments, due to rapidly growing business. This means a considerable increase in the number of skilled men employed, and it is expected, in the daily output of machines. The company recently purchased the entire business of the Universal Folding Machine Co., Chicago, and has moved the latter company's entire equipment to Cleveland. The folding machines will hereafter be manufactured in the Cleveland factory.

A marked increase in the business of the Toledo Machine Tool Co., Toledo, O., during the last six months has necessitated an addition to its works, and it is now letting a contract for the extension of its main shop, which will be 100 x 150 feet, three stories. The new building will be mostly equipped with large tools, specifications calling for 60-inch lathes, 8-foot boring mills, gear cutters, 30-inch slotters, etc. Additional cranes will be installed, and an additional crane runway will be provided, so that the total crane service will extend over 300 feet of the shop by 40 feet in width. The new building will be of mill construction, the floor of the main shop being of 10-inch concrete. In the past week, the company has made shipments to New England, the Pacific coast, Louisiana, and to Berlin, Germany.

The Vichek Tool Mfg. Co., 8017-8023 Central avenue, Cleveland, advises that it is erecting a building on Quincy avenue near Woodhill road, 40 x 100 feet. The equipment will be that of an up-to-date hand forge and drop forge plant. The regular stone tool dressing department will be continued with added improvements, with the object of making it one of the best plants in the middle west. The manufacture of tools such as stone cutters' bricklayers', masons' and plumbers' tools will be continued, and a special department devoted exclusively to the manufacture and finishing of automobile kits. The new plant will be run by gas engines, and the equipment will include drop hammers, with presses, trip hammers, lathes and milling cutters. Work will continue at the old plant on Central avenue until the new building is completed which will be about two weeks.

General Industrial:

The Indianapolis Belting & Supply Co., Indianapolis, has filed notice of the increase of its capital stock from $30,000 to $50,000.

F. M. Gammel and G. M. Bierman, Terrell, Tex, have purchased the Friend Bros.' machine shop formerly known as the Trollinger Machine Co. of that town.

The Wilmarth & Morman Co., Grand Rapids, Mich, grinding machinery, advises that its sales for February, 1909, lack only a few dollars of being three times what they were for the corres-

ponding month a year ago. This favorable showing is ascribed by the company's officers to the increasing popularity of its new "Yankee" drill grinders, and the sales of the new surface grinder, which has been added to its line.

The location of the plant and offices of the Edge Moor Iron Co. manufacturer of water tube boilers, through inadvertance was given in the issue of March 11 as Chester, Pa. The company is located at Edge Moor, Del.

The Shreveport Blow Pipe & Sheet Iron Works, Shreveport, La., advises in reference to its recent increase of capital stock from $10,000 to $100,000, that it does not contemplate the erection of additional buildings.

Surveys have just been completed of a limestone ridge between Maitland and Painterville, Pa., upon which the Cambria Steel Co. has an option which will expire in April. The ridge is four miles long by one-half to three-quarters of a mile wide, and contains a large deposit of limestone.

The Crawford & McCrimmon Co., Brazil, Ind., manufacturer of mining machinery, has announced that because of the receipt of a number of excellent orders, it has increased its working force, which for the past few months had been about half the usual number of men.

The steel car plant of the American Car & Foundry Co., at Berwick, Pa., has resumed work on the receipt of the order of cars for the D., L. & W. railroad, and is now employing about 3,000 men, as against 6,000 employed this time yast year.

Arrangements have been perfected for the sale of the Toledo, O., plant of the Pope Mfg. Co., for $400,000. This sale will complete the disposal of practically all the properties of the old company not found especially needful by the new organization.

The Penn Steel Casting Co., Chester, Pa., has shipped a casting weighing 70,000 pounds to the Camden Iron Co., Camden, N. J. It is one of the largest castings ever poured in Chester, being a bed plate for a hydraulic engine and pump ordered by the Camden company.

The Bridgeport Metal Goods Mfg. Co., Bridgeport, Conn., for the manufacture of brass specialties, has been incorporated with a capital of $50,000 by Anker S. Lyhne, Charles Phillips and Herman K. Beach, of Bridgeport, and Frank Harman, of New Haven. The company will occupy the plant of the Springfield Emery Wheel Co., corner of Spruce street and Howard avenue. Plant equipment has been bought and will be installed at once.

The re-organization of the Bates Machine Co., Joliet, Ill., preparatory to the enlargement of the business, will include converting the surplus of $300,000 into capital stock. Its present capitalization is $100,000, but it is proposed to capitalize the real estate, stocks, cash, etc., to the value of $400,000, to represent its actual value. Under the re-organization, W. O. Bates will succeed Mr. Winterbotham as president.

The Lorain, O., open hearth plant of the National Tube Co., faced an unusual problem recently. The top of No. 1 open hearth furnace collapsed March 13, just as the metal was about to be run off. Both brick and metal hardened into one mass, and for some time it was difficult to separate the material, blasting being prevented by the possibility of wrecking adjoining furnaces.

The annual election of officers of the Standard Roller Bearing Co., Philadelphia, resulted in the re-election of these officers: President, Samuel S. Creland; vice presidents, W. B. Osgood Field and Lenox Smith; secretary and treasurer, William M. Baldwin. Reports were received showing the receipt of satisfactory orders in Februrary amounting to over $1,000,000 at a general increase in prices.

The Milwaukee Wire Fence Mfg. Co., organized in Milwaukee some months ago, is now located at Twentieth street and St. Paul avenue, where a long lease has been secured on a factory building owned by C. D. Rogers. The Milwaukee Metal Stamping Co. has leased the former location of the Milwaukee Wire Fence Mfg. Co. at Nineteenth street and St. Paul avenue.

The Sheffield Rolling Mill Co.'s property at Sheffield, Ala., was sold at auction Feb. 24 by the trustee in bankruptcy, to the only bidder, H. H. Boyd of Memphis, for himself and James S. Pilcher, of Nashville, as trustees for the City Bank of Memphis, the American National Bank of Nashville, and the Sheffield National Bank, the bid being $28,000. The future of the plant has not yet been determined.

Trade Notes:—

The United American Iron & Steel Co. announces the opening of a district office at 915 Farmers' Bank building, Pittsburg, in charge of A. F. Baumgarten. The company has recently built a model scrap yard at Harrisburg, Pa., equipped with modern devices for handling scrap at minimum cost, and has facilities for handling and sorting 75 cars within its yards. The scrap is taken from the various shears by trolley system and weights are registered by automatic scales.

C. W. Leavitt & Co., importers and selling agents of ores, metals and alloys, announced that after March 20 their offices will be located in the Hudson Terminal, Cortlandt building, 30 Church street, New York City.

The Cutler-Hammer Mfg. Co., Milwaukee, maker of electrically controlled devices, announces the opening of a district office in Cleveland, at No. 1108 Schofield building. The new office will be in charge of C. J. Kruse, of the engineering department of the Cutler-Hammer Mfg. Co.

The Ferro Machine & Foundry Co., Cleveland, has appointed the A. R. Williams Machinery Co., of Toronto, agent for a large area of Canadian territory. The Williams company will carry a large line of the ferro marine gas engines, thus insuring quick delivery to Canadian buyers.

Fires:—

The Central Foundry Co.'s plant at Anniston, Ala., was damaged to the extent of probably $50,000, March 7.

The store house of the Niles-Bement-Pond Co., machine tools, at 265 Atlantic avenue, Boston, was badly damaged by fire March 7.

The foundry of J. M. Dutton, Vicksburg, Miss., was seriously damaged March 6, the loss being placed at $15,000, and the insurance $5,000.

The main building of the Easton Foundry & Machine Co., Easton, Pa., was seriously damaged March 18, the loss being estimated at $75,000.

The brass foundry of William Keating, Toronto, Ont., was badly damaged March 14, the loss being placed at $15,000, with insurance $11,000.

The brass and aluminum foundry of F. Bednarowicz, 911 West Indiana avenue, South Bend, Ind., was badly damaged March 9, the loss being fixed at $1,000.

Serious damage was inflicted upon the plant of the Capell Fan & Engineering Co., Mononaghela, Pa., March 19, entailing a loss of probably $70,000. Both machinery and patterns were damaged.

The three-story frame building used for shipping and storage by the Standard Foundry & Mfg. Co., East Seventy-fifth street and Grand avenue, Cleveland, was destroyed March 16, the loss being approximately $6,000.

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REVIOUS YEARS.

	1895	1896	1897	1898	1899	1900	1901	1902	1903	1904	1905	1906	TOTALS
									1,370				1,370
	27,931	110,821	98,847	104,510	93,025	119,940	68,429	110,993	107,886	81,164	138,396	195,855	1,353,792
9	183,296	95,809	149,594	295,821	337,807	404,645	477,212	646,203	522,035	374,944	423,696	431,000	5,589,297
	2,045						18,750	100,864	31,901	16,577		27,882	311,608
							17,326	64,664	123,236	151,114	133,246	186,496	994,237
													3,440
											16,625	21,004	75,425
					80,915	51,639	36,593	129,035	246,581	132,420	210,388	298,031	1,788,542
												15,773	121,354
									2,088	4,242	10,248	80,875	388,948
9	618,589	420,318	643,402	724,768	940,513	929,937	929,701	956,812	704,051	541,324	902,628	943,425	16, 596,287
													60,709
0	70,967	87,202	24,623	14,199	126,290	97,531	19,963	186,798			27,883		942,703
1	208,880	93,707	98,283	260,687	117,296	53,342	77,799	112,704	5,051	1,617	8,085	6,346	2,460,997
	13,037	44,526	95,210	128,233	147,346	197,770	230,614	195,555	117,096	180,983	152,256	111,871	1,784,265
					20,210	38,209							58,419
		3,396	41,942	76,877	111,952	167,115	245,183	245,583	161,559	33			1,339,133
				5,009	13,242	120,207	119,860	2,5.850	97,633	81,543	82,611	161,704	1,989,077
8	90,885	47,081	31,062	49,381	7,458			2,816	5,365		21,051	91,476	1,3.8,475
	2,107										1,819	3,121	18,719	
						1,316		10,383	9,863	11,257	11,973	28,321	379,789
6	22,820	35,136	37,594	93,663	74,235	35,756	15,395	130,798	95,877	153,452	233,858	169,459	2,486,828
													40,549
										11,988			11,988
								14,455	61,694	132,380	77,370	80 971	406,854
													20,906
		14,643		33,851	43,316	98,550	123,261	42,470	100,751	68,318	191,265	311,218	1,759,481
							11,444	7,599	1,294	4,737			49,159
	949	94,645	96,032	69,865	110,269	72,413	149,966	123,331	79,420	138,232	124,450	106,437	1,477,337
	1,201					11,008	20,355	74,596	53,828	38,288	9,704	20	348,878
					3,496	6,410	2,503					7,820	20,229

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Products of

THE SHENANGO FURNACE COMPANY

THE IRON TRA

LAKE SUPERIOR IRON ORE SHIPMENTS (Gross

[March 25, 1909.]

NAME OF MINE.	1908	1907	Prior to 1892	1892	1893	1894	1895	1896	1897	1898	1899	1900	1901	1902	1903	1904	1905	1906	TOTALS.
Mesabi Range																			
Adams	765,592	1,136,513					89,141	234,562	170,738	390,860	720,474	777,346	829,118	1,242,923	1,109,750	940,105	1,140,984	1,238,350	10,756,456
Adriatic	108,129	70,187																3,294	181,610
Agnew	164,486	149,054												45,582	108,847	96,435	44,651	163,260	772,345
Ajax (Kanawha)											14,963	64,218	41,300	24,829	28,983	912	28,489	9,057	207,630
Albany	64,860	437,521													109,608	153,433	241,186	336,371	1,362,979
Alberta	51,143	31,032																	82,175
Alexander	35,747	120,382															15,073	60,547	231,699
Auburn							108,210	376,970	131,478	175,263	235,630	385,992	263,692	427,510	38,283				2,143,028
Bessemer	120,350	78,012														86,303	112,630	131,791	529,086
Biwabik	365,781	803,750			151,500	90,048	247,069	242,565	427,464	383,180	553,836	924,868	410,074	623,127	807,511	647,614	1,092,987	807,374	8,518,748
Brunt	636	172,935																75,401	254,972
Burt	1,460,998	1,501,272															1,860,452	1,376,875	6,199,597
Canisteo	2,760	5,454																	8,214
Canton					24,416	213,353	359,020	16,261			99,498								713,048
Cass		36,121													50,155	29,554	59,552	65,961	241,348
Chisholm	228,386	258,793											34,573	200,629	168,831	130,732	231,296	379,156	1,632,366
Cincinnati	4,790	6,369			26,372		17,187	57,324	32,912		246						965	1,373	147,538
Clark	334,594	319,883											63,071	199,566	300,492	256,873	358,091	274,394	2,457,863
Columbia													15,627	350,799			1,360		16,987
Commodore	116,069	477,203			65,137	7,213		22,063	60,798	80,494	152,947	278,416	35,546	65,833	20,436	249	146,901	283,401	1,792,706
Corsica	77,674	172,220											26,838	59,292	34,043	30,131		100 606	500,810
Crosby	152,084	227,265																115,373	494,722
Croxton	154,868	349,853												18,594	100,297	348	130,228	162,533	916,721
Cyprus	115,745	260,948													121,818	244,343	235,351	192.144	1,179,349
Day										18,651	1,975			106,516	107,781	84,530			319,453
Diamond		171																	171
Duluth	149,185	93,120			37,626					112,155	165,435	128,587	150,024	150,220	150,053	149,819	142,172	158,336	1,588,732
Elba	147,916	134,488								564	9,547	121,707	224,630	207,454	93,616	123,425	125,724	255,580	1,444,651
Fayal	1,439,879	1,848,812					136,601	248,645	642,939	575,933	1,072,257	1,252,504	1,656,973	1,919,172	1,460,601	975,102	1,358,922	1,634,853	16,253,193
Forest	2,420	4,840														85,280	99,785	41,647	233,972
Fowler	21,511	34,014																	55 525
Franklin	8,246	30,926			46,617	223,399	286,423	231,086	30,128	200,400	60,000	168,524	39,299	111,085	92,019	65,528		66,935	1,660,615
Frants		907														62,884	70,210	11,068	145,069
Genoa		105,610						17,136	309,514	279,677	276,559	253,651	332,022	399,719	303,700	244,150	281,081	179,468	2,985,287
Gilbert	336,927	100,178																	437,105
Glen	272,142	205,426												23,875	171,705	280,412	287,835	279,424	1,520,819
Grant														51,946	18,928	44,413	49,227		164,514
Hartley	55,462	334,646																	390,108
Hawkins	248,246	270,984												5,892	107,905	99,055	202,070	294,588	1,225,740
Hector (Hale)		65,902			3,616	24,167	31,004	70,006	13,728		18,807	32,901	30,929	54,289			4,990	37,221	387,610
Higgins No. 2		173,439														35,286	238,598	341,319	788,642
Hobart		7,389															975		8,314
Holland		16,908															158,484	95,472	270,864
Holman	1,682	8,068																	9,750
Hull	163,020	157,365															233,066	282,592	836,043
Hull-Rust	2,926,683	2,900,493																1,690,311	7,517,487
Iroquois	151,071	254,329													17,562	50,215	61,109	190,971	725,257
Jennings	18,313	99,512																84,715	202,840
Jordan	118,529	61,998												147,931	190,024	97,474	185,854	110,768	912,576
Kellogg	31,331																		31,331
Kinney	176,510	145,969													32,352	6,225	89,161	57,641	507,928
La Belle	51,638	56,146												70,753	48,298	89,554	78,597	50,466	445,452
Lake Sup. Group							58,123	67,659	259,912	135,404	154,326	284,023	594,761	766,311	1,226,066	1,415,884			4,962,469
Larkin (Tesora)	14,030	22,040																12,001	48,071
La Rue	79,313	301,522													53,335	105,170	197,192	175,670	912,202
Laura	176,725	149,410												16,453	79,286	3,778	27,207	138,400	590,860
Leetonia	289,490	301,368												28,784	200,163	228,536	352,004	308,989	1,709,334
Leonard		137,316													10,591	151,952	297,011	254,368	851,238
Lincoln	379,219	297,870												87,908	279,399	153,822	275,777	367,192	1,841,187
Longyear														22,788	81,604	221	16,778		121,391
McKinley	1,399	17,706																	19,105
Mahoning	611,592	1,564,382					117,884	167,245	519,892	520,751	750,341	911,021	765,872	1,038,645	1,009,446	706,325	1,011,661	1,274,232	10,969,239
Malta	93,072	82,069									28,615	65,346	126,299	222,640	11,675	66,641	139,853	115,763	951,999
Mariska	30,226	137																	30,363
Mayas		113,521																107,244	220,765
Miller	224,321	279,453															118,520	234,071	856,365
Minnewas	525				13,858	2,140													16,523
Minorca	80,330	154,661												35,499	115,886	121,739	117,653	155,541	781,309
Mohawk	119,439	123,870																92,715	941,024
Monroe		100,809															13,730	310,839	451,378
Morris	528,154	2,076,328															1,070,937	1,809,743	5,485,242
Morrow	1,571	34,935												35,571	49,409	33,012	60,725	61,073	279,296
Mtn. Iron (Aetna)	206,698	1,973,519		4,245	121,463	573,440	371,274	159,744	773,538	650,955	1,137,970	1,001,324	1,058,160	1,617,772	1,348,714	1,168,855	2,495,089	2,563,111	17,198,571
Myers	150,249	153,770															188,568	228,451	721,088
Nassau		19,172																	19,172
Onandaga	30,887	521																	31,408
Pearce		71,645												54,884	50,204	235		65,862	242,830
Penobscot										11,933	29,652	85,619	146,641	209,531	1,615				706,071
Pettit	57,140	36,074												17,278	52,706	27,088	140,239	82,757	413,282
Pillsbury	59,889	489,718									99,691	106,487	101,032	238,122	229,133		161,924	33,546	1,640,265
Roberts										18,614		57,847	41,965	42,786	28,972				190,154
Rust	227,079	213,355															272,114	284,517	997,065
Sauntry-Alpena												53,004	68,560	328,739	249,837				700,140
Scranton																1,168			1,168
Sellers	354,780	155,060					47,433	153,037		112,765	174,867	56,280	34,918	193,428	251,631	207,990	261,501	241,031	2,244,721
Sharon													56,810	224,526	48,199				329,535
Shenango	461,887	387,693														51,712	213,097	383,717	1,497,566
Silver	49,291																		49,291
Sparta										66,722	226,156	257,143	202,144	156,426	227,444	40,458	59,692	27,777	1,244,197
Spring	20,516	15,257																235	35,773
Spruce (Cloquet)	430,633	610,457				5,628	47,700	96,280	12,215		1,621	101,675	279,515	543,203	587,153	589,319	606,295	674,812	4,586,296
St. Clair															6,148	26,748	61,792		94,688
St. Paul		113,200																24,230	137,430
Stephens															87,055		367,764		454,819
Stevenson	516,770	1,142,977										56,031	666,273	1,434,681	1,014,582	1,652,021	1,428,614	1,041,500	8,953,449
Susquehanna	182,352	137,207																20.954	340,543
Sweeney	7,579																		7,579
Tener	174,033	190,903															58,186	174,309	597 351
Troy	40,283	100,730													15,099	12,759	87,584	146.849	403,304
Union	20.937	51,825											8,297	93,109	91,496			20.691	399,877
Utica	57,194	604,864												9,009	156,180	120,697	185,944	268,281	1,104,169
Victoria	21,310	90,090																64,820	176 220
Virginia (Group)	661,329	1,015,717			123,015	544,954	622,712	955,739	749,499	560,848	293,851	417,473	5,420	5,131	5,866	5,395	402,224	5.674	6,374,647
Wascoutah		158,692																6.766	165.458
Webb	19.610	113,334															71,235	165.604	369,783
Williams (N. Cin'ti)		35,267					3,046	11,249			12,857	18,238						17,685	97,842
Wills														12,158			4,550		16,708
Winnifred (Day)	61,341	94,867													39,179	81,686		3,415	280,488
Yates	86,308	210,726														53,179	58,174	265,299	673,676
Yawkey	84 446	15,453																	99,899
Total	17,257 350	27,495,708		4,245	613,620	1793,052	2,781,587	2,882,079	4,275,809	4,613,766	6,626,384	7,809,535	9,004,890	13,342,840	12,892,542	12,156,008	20,158,699	23,819,029	167,527,143
Gogebic Range.																			
Anvil	35,937	39,495	127,514	42,090		13,297	68,064	57,483		5,037			1,101	135,502	11,309	45,595	82,118	79,493	744,035
Ashland	259.611	298,056	1,391,533	231,896	66,067	83,020	126,096	91,149	111,625	123,208	154,615	232,961	286,399	301,824	274,138	344,102	409,131	341,841	5,127,272
Atlantic	41,465	91,759	1,349				70,989	60,727	50,307	38,058	19,964	135,955	190,135	190,213	148,385	77,224	208,039	97,689	1,422,278
Brotherton	96,776	104,224	251,567	130,833	18,905	47,148	40,567	50,490	46,186	73,198	78,858	89,804	103,109	53,255	94,986	84,870	137,351	147,281	1,649,408
Cary (and Superior)	96,358	209,407	526,198	174,003	31,052	47,156	63,787	66,975	37,693	43,162	62,524	125,984	180,215	136,895	89,221	61,860	146,414	216,992	2,315,896
Castile		6,157																2,108	8,265
Chicago	58,305	94,480	1,226,644	69,968	59,346	32,616		504							633				68 727
Colby			1,497	21,754	15,210		10,253	48,492	22,921	152,875	103,239	32,572	23,475	44,625	22,965	81,141	83,736	113,001	2,280,252
Davis (Wisconsin)	122,324	57,904	37,701	10,655	31,385	18,329	26,105	4,544			5,029	3,569		22,526	54,915	11,225	3,160		103,961
Eureka														31,530	734			37,535	346,472
Geneva		19,319	318,386	4,283	7,964				1,015		1,255	986	10,358	20,502	7,108				7,108
Harm'y (Germania)			184,928									7,728	21,475	36,383	2,246	23,364	2,978	9,436	422,087
Hennepin		17,347	193,425	161,635	23,976	45,109	148,228	81,351	96,763	58,418	105,934	54,664	43,883	79,121	862		2,589	5,765	259,733
Iron Belt	2,508	190,968	58,368								7,977	25,047		8,555	25,353			3,227	1,140,942
Ironton	92,932			3,944	1,651				1,265			33,893	19,988	102	16,875	23,197	41,314	106,158	571,391
Jack Pot			13,026	54,779	9,604	11,782					332	7,844	34,140	19,117	31,709	6,538			99,090
Meteor (Comet)	86,617	168,591					4,788		11,397		10,324	1,090	91,846	98,834	6,156	59,587			216,367
Mikado	177,006	159,763	416,719	73,409	34,299	46,037	138,882	131,531	191,106	270,776	153,307	107,524	72,945	136,354	108,709	25,611	140,740	154,043	897,890
Montreal	579,390	551,496	879,070	165,962	109,718	150,392	157,821	142,369	150,979	196,953	263,711	217,201	190,448	141,571	93,139	163,021	107,854	139,202	2,612,874
Newport	773,243	1,109,085	4,536,311	1417,943	755,600	1030,834	1,204,323	585,221	990,899	1,057,957	1,148,907	1,098,742	1,083,398	1,483,013	1,145,711	831,558	1,527,128	1,245,947	23,075,870
Norrie Group	33,893	46,424	64.020	6,711	3,956	2,437								26,141	87,929	30,420	21,986	57,219	381,136
Ottawa (Odanah)			129,215	102,382	2,658	37,911	46,965	114,108	207,153	175,925	154,705	139,658	7,603	32,113	60,800	53,718	13,953	5,622	1,284,489
Palms	6,303	24,922										3,434	6,346	6,343	115		11,161	17,934	76,558
Pike			86,525										21,788			1,259			109,572
Puritan (Ruby)								12,196	16,102	15,691	11,819								55,808
Shores	111,130	101,899	101,417	56,046	22,876	34,323	20,970	89,441	45.815		12,526	74,097	89,997	144,630	91,383	50,625	79,209	86,379	1,213,263
Sunday Lake	111,184	312,496	28,415	233,356	125,118	209,077	418,188	250,205	276,890	287,203	500,830	481,909	446,670	468,672	211.534	204,581	188,104	169,097	4,934,129
Tilden														11,065	310				11,375
Upson													12,836	26,043	46,211	46,860	60,224	56,657	301,715
Yale (West Colby)	14,874	38,010																	157,798
Miscellaneous			131,116	11,427			1,950	13 185	120										
Total	2,699 856	3.637.102	10,254,964	2973,076	1329,385	1809,468	2,547,976	1,799,971	2,258,236	2,498,461	2,795,856	2,875,295	2,938,155	3,654,929	2,912,708	2,398,287	3,705,207	3,643,514	56,732,446
Miscellaneous — (In Wisconsin)																			
Illinois	51,108	72.180														47,922	71,413	67,118	309,741
Iron Ridge		3.966													17,913	19.558	39,978	61,624	143,039
Mayville	71,341	19,644		9,044	7,925	10,511	16,472	13,144	10,546	18,151	19,731	20.986	22,400	23,338	18,836	26,562	20,610	15.847	345,088
Total	122 449	95.790		9,044	7,925	10.511	16,472	13,144	10,546	18,151	19,731	20,986	22,400	23,338	36,749	94,042	132,001	144,589	797,868

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RADE REVIEW

(Gross Tons) FOR 1908 AND PREVIOUS YEARS.

[Vol. XLIV, No. 12.]

NAME OF MINE.	1908	1907	Prior to 1892	1892	1893	1894	1895	1896	1897	1898	1899	1900	1901	1902	1903	1904	1905	1906	TOTALS
Menominee Range.																			
Alpha		160,996													1,370				1,370
Antoine		441,636	145,185	167,948	127,901	138,209	27,931	110,821	98,847	104,510	93,025	119,940	63,429	110,993	107,886	81,164	138,395	195,855	1,353,798
Aragon	226,354	36,665	76,924				2,045						18,750	100,864	31,901	16,577		27,882	311,608
Armenia		189,119											17,326	64,664	123,236	151,114	133,246	186,496	994,237
Baltic	129,037																		3,440
Berkshire	3,440	20,368	17,430														16,625	21,004	75,425
Breen		345,676		57,352	9,612						80,915	51,639	36,593	129,035	246,581	132,420	210,388	298,081	1,788,543
Bristol (Claire)	190,300	51,646	38,713															15,773	121,354
Calumet	15,222	138,867													2,088	4,242	10,248	80,875	338,948
Caspian	102,628	855,308	4,692,570	675,829	489,243	236,249	618,589	420,318	643,402	724,768	940,513	929,937	929,701	956,812	704,051	541,324	902,628	943,425	16,596,287
Chapin (Ludington)	391,620	14,883																	60,709
Chatham	45,826																		942,703
Columbia			196,939	57,682	22,426	10,300	70,967	87,202	24,623	14,199	126,290	97,531	19,963	186,798			27,883		2,460,997
Commonwealth			851,876	249,113	151,291	174,921	208,880	93,707	98,283	250,687	117,296	53,342	77,799	112,704	5,051	1,617	8,085	6,346	1,734,265
Crystal Falls	296	114,158	5,315				13,037	44,526	95,210	128,233	147,346	197,770	230,614	195,555	117,096	180,983	152,255	111,871	58,419
Cuff											20,210	38,209							1,339,133
Cundy (Quinnesec)	1,410		283,323					3,396	41,942	76,877	111,952	167,115	245,183	245,583	161,559	33			1,939,677
Dober (Riverton)	47,073	90,358	903,411	1,176						5,009	13,242	120,207	119,860	215,850	97,633	81,543	82,611	161,704	1,328,475
Dunn	8,829	141,992	614,285	133,666	58,590	24,538	90,885	47,081	31,062	49,381	7,458			2,816	5,365		21,051	91,476	18,719
Eleanor (Ap'l'ton)		1,677		4,377	5,618		2,107										1,819	3,121	379,789
Fairbanks (P't R.)		75,805	212,481	18,390								1,316		10,383	9,863	11,257	11,973	28,321	40,540
Florence	140,354	178,955	1,008,870	48,246	9,634	2,726	22,820	35,136	37,594	93,663	74,235	35,756	15,396	130,798	95,877	153,452	233,858	169,459	2,486,528
Fogarty	32,560	7,949																	11,988
Forest																11,988			405,354
Genesee (Ethel)		38,984												14,455	61,694	132,380	77,370	80 971	20,905
Gibson	4,548		16,357																1,759,481
Great Western	124,246	234,492	284,952	87,487	661			14,643		33,851	43,316	98,550	123,261	42,470	100,751	68,318	191,265	311,218	49,150
Groveland	9,123	13,913	1,049										11,444	7,599	1,294	4,737			1,477,337
Hemlock	83,834	117,181	35,531	65,459	11,323		949	94,645	96,032	69,865	110,269	72,413	149,966	123,331	79,420	136,232	124,450	106,437	348,878
Hiawatha	138,190				1,683		1,201					11,008	20,355	74,596	53,828	38,288	9,704	20	20,329
Hilltop											3,496	6,410	2,503					7,820	21,140
Hollister	10,671	6,371	3,077	1,021															28,590
Hope				15,543	2,275									3,373	7,339				62,120
James	59,760	2,360																	98,101
Keel Ridge			59,465	5,997	3,298		19,441				4,900								16,224
Kimball		16,224																	555,341
Lamont (Monitor)		42,090	69,713	42,819	13,777	2,600					67,652	31,323		47,267	43,736	29,393	74,991	89,989	239,970
Lincoln		714	1,813	26,019	8,757						43,622	72,959	19,727	7,747	15,606	17,577	19,539	5,890	1,098,407
Loretto	13,354	99,779			8,131	55,983	53,160	34,334	54,104	68,447	64,824	61,219	54,985	128,300	87,939	54,720	118,738	140,390	994,286
Mansfield	44,633	183,532	68,139	69,259	69,558				37,182	60,739	86,607	90,155	74,113	31,181	51,440	79,163	38,584		153,797
Michigan	603	39,819				77	1,071		216					53,272			58,088	146	357,180
Millie (Howitt)	3,322	18,691	109,121	6,780	505	13,062	10,924	21,815	10,374	17,430	15,194	14,922	12,133	25,935	40,860			36,815	9,310
Monongahela													2,397		6,913				255,315
Munro	27,773	46,884													8,739	32,332	92,183	47,454	373,765
Nanaimo	305	53,778	127,666													9,086	91,238	91,792	35,810
Northwestern			17,206											1,324	17,280				8,072,371
Penn Iron M'ng Co.	176,211	381,128	3,310,886	352,141	280,450	175,274	290,622	179,917	237,886	223,713	229,651	197,606	358,126	273,443	343,543	141,948	423,244	496,582	6,471,336
Pewabic	365,341	457,796	110,587	115,273	165,745	304,019	262,551	273,587	279,855	305,072	530,129	374,043	507,786	530,291	489,175	372,791	533,413	493,891	482,991
Saginaw (Perkins)	38,669	26,080	395,064				2,161											21,017	116,259
Sheridan			8,834	45,745	2,234		16,754	3,419	146		31,104	8,063							1,055,069
Tobin	161,642	237,781											18,957	55,238	45,386	113,669	166,529	235,867	130,975
Verona												5,143	11,475	43,245	50,910	20,202			406,412
Vivian	10,056	42,493												40,384	12,128	81,364	90,426	122,577	221,235
Youngs	70,094	92 632															10,936	47,583	1,832
Zimmerman	1,832																		1,057,306
Miscellaneous			995,125	14,477	23,488		23,746	113	661										
Total	2,679,156	4,964,728	14,661,809	2261,499	1466,197	1137,949	1,923,798	1,560,467	1,937,013	2,522,265	3,301,052	3,261,221	3,619,053	4,612,509	3,749,567	3,074,348	4,495,451	5,109,088	66,337,670
Marquette Range.																			
American (Sterling	23,222	13,764	97,857	15,076														419	150,338
Austin	111,229	195,950																	307,179
Beaufort (Ohio)	61,035	78,029	90,217									1,583	4,338	59,781	134,648	25,781	38,306		493,718
Bessie			847											5,007	29,718		21,579	1,846	59,097
Breitung Hem. No. 2	55,849	59,667													7,854	9,869		38,671	171,910
Cambria	85,977	135,145	623,881	41,549	30,445	47,218	41,656	95,086	110,648	102,623	124,930	80,432	68,907	63,976	41,168	84,852	81,791	40,628	1,900,912
Champion	313	107,577	2,684,527	109,979	61,648	42,788	100,398	113,375	141,728	163,190	215,074	113,743	99,026	205,721	74,238	174	64,680	115,007	4,388,186
Cleve'd-Cliffs Gr'p	438,379	1,030,928	7,114,382	600,302	243,917	797,466	480,195	513,119	718,408	869,482	1,011,048	881,021	860,484	1,104,864	810,845	743,263	1,288,416	1,330,944	20,572,463
East New York			130,157	35,175	911							27,987	31,696	38,761	22,523	7,299	33,095		327,604
Empire	53,537	40,565																	94,102
Foxdale																			31,447
Hartford	278,366	328,161	566	5,678	6,513	940		1,582					4,647	15,015	5,053	3,429	3,303		1,516,271
Imperial	48,231	55,758	57,012	7,194										7,440	20,085	179,980	322,209	364,801	261,213
Jackson		61,345	3,162,615	92,567	51,009	32,288	42,186	80,710	79,102	55,012	23,235	62,321				727	1,661	5,076	3,874,153
Lake Angeline	220,410	283,373	2,044,062	287,517	351,973	355,453	313,555	342,251	489,685	460,335	88,230	31,714	38,271	15,449	5,409		33,180	6,066	8,008,162
Lake Superior	261,955	674,066	5 351,292	366,715	329,610	344,758	342,439	459,576	376,761	686,563	464,968	389,128	481,574	304,125	310,950	262,486	374,183	269,116	14,612,128
Lillie	8,632	80,545	262,521	29,005	68,861	78,388	54,285	107,532	112,781	211,023	682,595	709,143	635,642	832,796	604,829	590,339	727,378	636,071	1,686,782
Lucy (McComber)	1,115		445,990	26,326	21,964				10,033	11,846	196,200	114,990	98,788	79,919	77,454	63,209	9,868	32,781	517,359
Maas	29,036	32,378																85	61,414
Magnetic (st'k pile)																		202	202
Mary Charlotte	99,104	155,633													34,303	48,885	221,738	257,088	816,751
Mitchell	11,539		17,780																29,319
Moore												4,648	37,655		25,828				68,131
Negaunee	232,219	206,170	269,587	85,846	69,732	132,581	90,682	175,394	182,169	191,330	195,573	126,829	234,713	204,286	224,665	145,182	239,554	253,448	3,349,910
New York (York)			1,055,395	11,220	25,000	21,487					6,642	3,327							1,123,071
Palmer								1,041										13,131	14,172
Princeton (Sw'nz'y)	36,033	177,843	161,997	29,403	19,096		6,593			25,247	55,802	75,037	67,051	118,048	84,223	76,461	129,079	166,894	1,228,827
Queen (Blue)	104,098	309,917	1,155,932	379,719	120,673	252,469	204,957	323,057	242,293	61,022	342,978	398,298	400,845	418,044	254,658	311,479	253,377	221,096	5,764,912
Republic	67,999	170,554	3,737,096	167,991	64,195	105,719	174,027	127,360	124,342	140,312	137,085	130,126	104,604	157,646	155,415	124,508	150,899	177,220	6,016,896
Richmond	60,994	35,156						1,088	4,630	24,464	4,613	51,303	54,181	50,041	55,593	68,134	86,129	89,563	585,889
Rolling Mill	52,147	49,204	234,625						3,975			22,585	22,815	24,574	6,786		28,766		445,777
Star West (Wheat)			114,589			5,550	51,207	9,658	942		6,716	15,987							206,049
Stephenson	52,588	6,305																	58,893
Volunteer		10,022	763,646	127,130	69,561	26,946	32,672	53,216	1,617		29,983	47,578		32,736	7,395	71,870	106,281	38,544	1,419,197
Washington	20,625																		20,625
Webster			14,108									20,797							34,905
Winthrop (Mqtte.)			374,970	201,213	180 071	134,365	119,120	150,496	106,894	122,592	171,318	148,945	109	129,496	72,433				1,912,022
Miscellaneou			5,289,711	47,251	15,714	81,814	43,866	49,730	9,027										5,537,143
Total	2,414,632	4,388,073	35,255,362	2666,856	1835,893	2060,260	2,097,838	2,604,221	2,715,035	3,125,039	3,757,010	3,457,522	3,245,346	3,868,025	3,040,245	2,843,703	4,215,572	4,067,187	67,847,919
Vermillion Range.																			
Chandler	50,639	245,684	1,070,803	651,655	435,930	558,050	605,024	471,545	433,365	715,919	808,359	644,801	627,379	645,786	460,548	422,162	365,729	318,990	9,537,378
Pioneer	477,506	830,700	18,235	2,651			40,054	149,073	207,103	123,183	339,897	450,794	678,310	673,863	596,735	505,432	653,682	766,853	6,514,071
Savoy	82,521	43,320									81,022	170,446	212,008	243,937	169,616	74,866	91,775	106,933	1,276,444
Sibley	127,544	226,835									5,169	4,670		78,304	113,595	122,783	251,170	271,496	1,201,566
Soudan (Minnesota)	53,070	102,977	3,028,585	498,353	370,303	390,463	432,760	448,707	592,196	426,040	457,732	325,020	208,284	275,168	175,114	70,713	205,002	146,503	8,208,990
Zenith	50,264	235,751		14,991	14,388			18,765	40,817		79,323	60,089	60,082	167,205	161,091	86,557	109,818	181,580	1,280,721
Total	841,544	1,685,267	4,117,623	1167,650	820,621	948,513	1,077,838	1,088,090	1,278,481	1,265,142	1,771,502	1,655,820	1,786,063	2,084,263	1,676,699	1,282,513	1,677,186	1,792,356	28,017,170
GRAND TOTAL	26,014,987	42,266 668	64.289,758	9082,370	6073,641	7769,753	10,445,509	9,947,972	12,475,120	14,042,824	18,271,595	19,080,379	20,615,907	27,585,904	24,308,510	21,949,401	34,384,116	38,565,762	407 080,116

MINES NOT PRODUCING SINCE 1898.

MARQUETTE RANGE.

Ames	6,298
Bay State	16,637
Boston	62,542
Braastad (Mitchell)	136,736
Braastad (Winthrop)	831,445
Chicago	9,012
Columbia (Klomin)	94,813
Curry	16,671
Detroit	140,841
Dexter	118,512
Dey	2,709
East Champion	76,002
Edison	893
Erie	8,136
Etna	1,091
Fitch	31,817
Goodrich	49,754
Grand Rapids (Davis)	110,736
Hortense (North Champion)	30,574
Humboldt	723,961
Iron Mountain	393
Manganese	6,359
Michigamme	880,362
Milwaukee	375,432
Mesabi's Friend	16,043
National	150,216
Negaunee Con. Wks.	12,708
N. Republic	289
N. Y. Hematite	37,587
Northwest	1,687
Nonpareil (St. Law.)	23,395
Norwood	5,753
Ogden	986
Pascoe	59,806
Pendill	45,993
Phenix (Dalliba)	59,114
Pioneer	15,409
Platt	73,844
Primrose	6,040
Quartz	491
Republic Reduction Co.	47,174
Richard	8,261
Riverside	16,160
Saginaw	451,424
Samson (Argyle)	267,805
Schadt	1,261
Section 12	21,887
Spurr	164,244
Taylor	32,970
Titan	90,371
West Republic	133,077
Wetmore	50,870
Wheeling	10,552
Total	5,537,143

MENOMINEE RANGE.

Beta	4,211
Brier Hill	14,981
Cornell	49,302
Delphic	33,770
Emmett	66,585
Half and Half	7,524
Hamilton (Ore Co.)	96,072
Hersel	955
Indiana	17,871
Lee Peck (Cherry Valley Ore)	2,844
Manganate	6,844
Mastodon	425,708
Metropolitan	107,027
Perry	3,138
Selden	2,092
South Mastodon	8,203
Stephenson	39,350
Sturgeon River	19,404
Youngstown	151,425
Total	1,057,306

GOGEBIC RANGE.

Bessemer	20,889
Blue Jacket	1,799
Federal	36,443
First National	1,997
Iron Chief	12,199
Iron Chief No. 2	551
Pence	40,566
Sparta	4,862
Trimble	25,931
Tyler's Forks	10,683
Valley	1,878
Total	157,798

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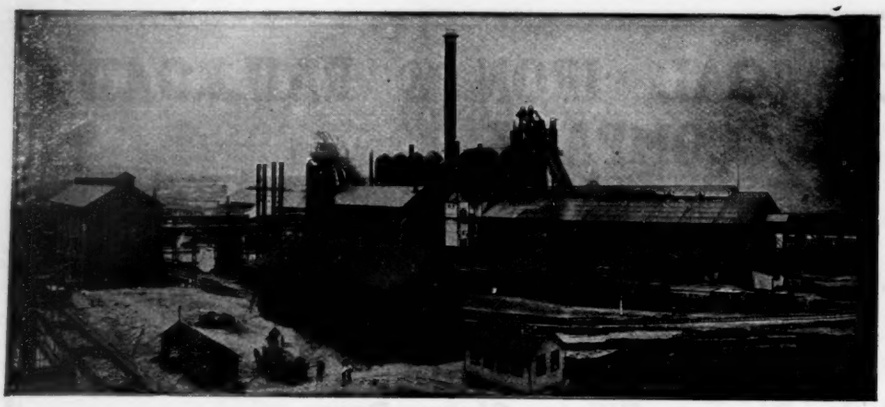

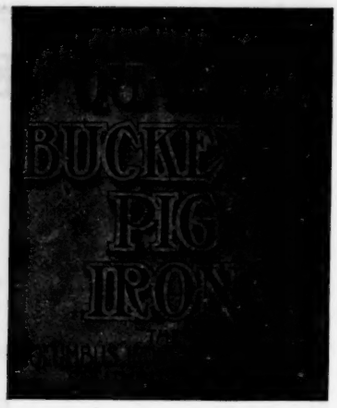

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1—22x11 Rohn Speyer & Carpenter " "
2—18x12 Lodge & Shipley " "
1—18x10 Dietz & Schumacher & Boye " "
2—18x " Putnam " "
1—18x10 Blaisdell " "
1—16x 6 Perkins " "
1—14x 8 Flather " "

PLANERS

1—60x60x16 ft. Betts (3 Heads)
1—58x58x10 " Hughes & Phillips (2 Heads)
1—54x54x22 " Wiles 4 Heads)
1—41x41x13 " New Haven (2 Heads)
1—30x30x 9 " Gray 2 Heads)
1—24x24x 6 " Smith & Silk
1—22x22x 5 " New Haven
1—16x16x 4 " " "

DRILLS

1—5 ft. Universal Radial Universal Drill Co.
2—4 1-2 ft. Plain " W. E. Gang & Co.
1—4 1-2 " " " Universal Drill Co.
2—28 Barnes B Geared Drill Presses
1—5 ft. Bickford Universal Drill
1—3 1- ft. Radial Drill Universal Table
1—30 in. B. Geared Barnes Drill Press
1—24 " " " " "

BORING MILLS

1—10 ft. Betts 2 Swivel Heads almost new
1—0 " " Walbum & Swenson 2 Swivel Hds.
1—50 inch Bullard
1—36 " Boring mill 1 swivel head
1—Turret Head Bullard

MISCELLANEOUS

1—Gisholt Tool Grinder
1—No. Mitts & Minnell Vertical Key seater
1—Yankee and Twist Drill Grinder
1—Cincinnati Universal Tool Grinder
1—No. 4 Rudalphi & Krummal Punch Press
1—No. 3 " " " "
1—30 inch 3 Drum "Invincible" Sander
1—McDonough Mfg. Co. Band Resaw

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